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Highway Construction Knows No Business Depression

By L. W. MOFFETT

ANALYSIS of the present-day highway industry discloses three outstanding factors—the suddenness with which it has attained mammoth proportions; the quality of its product and the reduction of construction costs.

In the past decade the good roads movement has grown so rapidly that now almost every civilized nation in the world is setting its money and man-power at work extending its road mileage. The United States, always a leader in the movement, maintains this position by an annual expenditure of funds which

is soaring above the \$2,000,000,000 mark. The benefits from modern highway transportation flow to a wide range of industries, such as iron and steel, metal-working, machinery, asphalt, brick, cement, and numerous others. To labor it means much employment.

Many things have contributed to the great increase in quantity, improvement in quality and decrease in cost of roads.

Automobile registration over a period of 30 years has increased in the United States from a mere 3000



Construction of concrete highway with steel reinforcing mats

to the present figure of 26,501,443. Some 5,621,709 motor vehicles were produced in the United States and Canada in 1929.

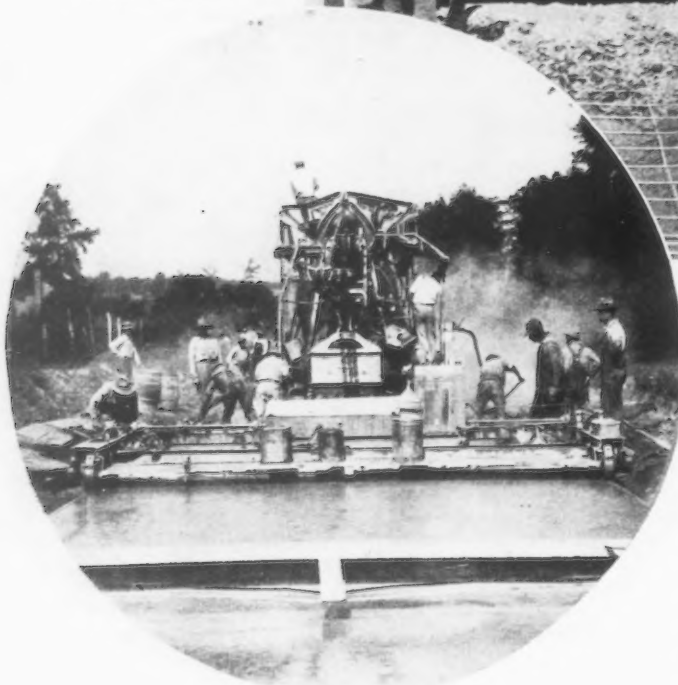
Motor Vehicles Paying Heavily

Whether these automobile sales brought good roads or whether the greatly increased mileage of improved roads created the automobile sales is a moot question. But it is sufficient to say that the motor vehicle is paying its way over America's highways in a decidedly good manner.

In 1929, motor vehicle owners paid \$347,843,543 to the States in registration fees; \$431,636,454 in

A survey of the movement of fruit and vegetables to the metropolitan areas of New York and Philadelphia in 1928 shows that 73 per cent of the shipments were made by motor truck. It is estimated that 1,200,000 truck loads of livestock were moved in 1929 over an average haul of 50 miles. Increases in livestock receipts by truck ranged as high as 60 per cent at 12 of the nation's leading livestock markets when 1929 and 1928 figures are compared. Fifty-five railroads operate an estimated total of 5900 motor trucks over the highways. The electric and steam railroads also operated in 1929 more than 25 per cent of the 92,500 motor buses in the United States. Of these,

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PLACING
mesh reinforced concrete pavement, paving one-half of a street at a time, and (in circle) surfacing a concrete road



48,350 were operated for revenue and 42,000 were in school use.

Federal aid, created by Congress in 1916, has been of such force to the cause of good roads as to revolutionize public thought on the question and bring about an organized effort that was unheard of prior to that time. With each of the 48 State highway departments thoroughly organized in order to obtain and match its share of Federal funds, the counties and townships, in some cases, have learned the value of organized effort in road work and have acted along this line.

Federal Funds Have Been Increased

The annual allotment of \$75,000,000 from the Federal Treasury has become so firmly established as a good investment that Congress last spring increased the Federal aid for the next three years by \$50,000,000, making an annual total of \$125,000,000, which will boost the highway expenditures and mileage to new high records during the period covered.

All these things that have brought about increased road mileage have also had a definite influence on improved construction, or better quality roads. The great forward strides that have been taken in this direction are making the highway into a practical system of transportation for the commercial, economic and convenient purposes of the national life. Today highway construction reflects the genius of the road

gasoline taxes; \$20,000,000 in municipal taxes and \$130,000,000 in personal property taxes. These sources created a grand total of \$929,479,997, of which probably 90 per cent was returned at once to the road programs of the various State and local governments for use in maintenance or improvement of present road mileage, or construction of new roads.

Motor Truck Traffic Aids Road Building

The rapid development of motor truck traffic has been another important factor in the growth of road mileage. Exhaustive data are at hand to show the part the motor truck is taking in commercial traffic. Only a few figures, however, need be given to indicate the expansion of this form of transportation.



STEEL mesh
Highway
safety guard on
modern concrete
highway in
Florida

builder, and of makers of machinery and materials. Construction prompted by political consideration or mere public enthusiasm and the use of unsuitable surfaces and indifferent foundations have practically disappeared. Disappearing also is the practice of using up all the road funds for costly highways between great cities and letting the farm communities and small towns that lie away from these routes languish in the mud. Out of the picture also is the former practice of building township and local roads that failed to link up with systems that led anywhere.

Engineering research, carried on over recent years, has developed intelligent planning, comprehensive financing and mechanical construction. The manufacturers have kept pace and through careful study of modern road problems have brought out machinery to meet, and, in some cases, to anticipate the demands.

American manufacturers in 1927 produced \$27,-

727,585 worth of highway machinery, an increase of \$10,000,000 over their output of six years previous. These figures will be eclipsed in the returns of the greatly expanded programs at present. New and im-

proved machinery is constantly being fabricated to accomplish the newer methods of road construction more rapidly and efficiently. Research in the iron and steel industry has bettered the product from which practically all road-building equipment is made.

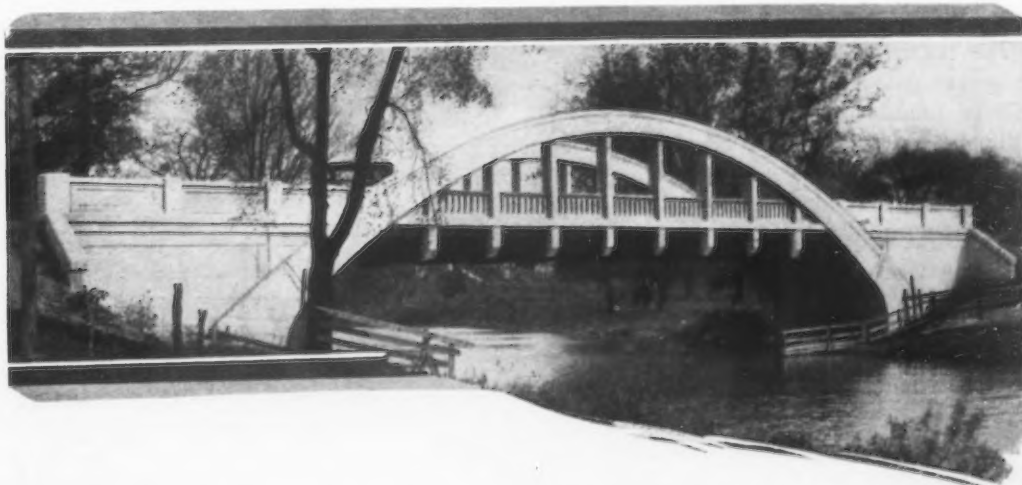
Refinement of road construction materials is the aim of many groups producing high class materials. Among them are such organizations as the Wire Reinforcement Institute, the Portland Cement Association, the Asphalt Institute, the National Sand and Gravel As-

sociation, the Crushed Stone Association and the National Paving Brick Manufacturers' Association.

Steel reinforcement, practically unknown to highways 20 years ago, is now in use and giving satisfactory results in all States which have heavy traffic,

SPEAKING for the American motor industry, at a White House conference recently, Alvan Macauley, president, National Automobile Chamber of Commerce and of the Packard Motor Co., told President Hoover that one of the largest questions facing public authorities is that of road finance.

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THE modern
type of con-
crete highway
bridge



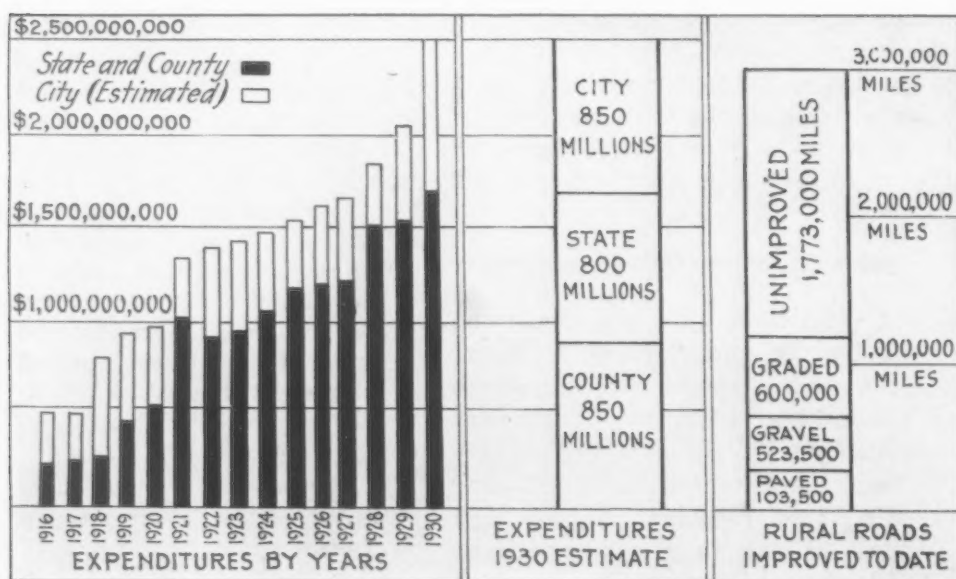
severe climate and bad conditions of subgrade. Almost all concrete construction today may contain dowel bars, tie bars or marginal bars, but roads are not actually considered reinforced without longitudinal and transverse steel spread throughout.

According to extensive research, reinforcement prevents the small initial cracking due to contraction of the pavement while the concrete is setting, which frequently develops into large cracks; it provides resistance to cracking caused by expansion and contraction in subgrades; enables the pavement to carry much heavier traffic loads without damage; prevents cracks from opening and permitting frost or chemical action; and reduces maintenance almost to a minimum.

For instance, New York, a heavy traffic State, finds maintenance cost of reinforced pavement only one-fourth that of the plain type, and New Jersey officials

highway industry have been the United States Bureau of Public Roads, Department of Agriculture, and the American Road Builders' Association. The bureau administers the distribution of Federal aid.

Each year for the past 28 years, committees of outstanding leaders in State, city and county highway work have studied the major problems of the industry and prepared reports which formed the basis of the annual convention of the American Road Builders' Association. The scope of this effort is seen in the statement by Charles M. Upham, association engineer-director, that the 1931 gathering Jan. 10-16 in St. Louis will attract some 30,000 actual road builders to hear the reports for this year and the committee recommendations for improved road practice, and to view the road show with every imaginable modern machine and tool used in road construction.



How road building has been increasing year by year is shown by this chart prepared by the American Road Builders' Association

declare reinforced pavements offer practically no maintenance difficulties.

The necessity for road systems that would reach every part of the vast national area has induced much research in highway financing to make possible increased mileage from the available funds. Costs of all types of roads are rapidly being lowered, due to mass production, efficient mechanized equipment and methods, keener competition by contractor-bidders and in sales of equipment, and better knowledge of requirements on the part of both the engineers and the manufacturers. Maintenance costs also, in spite of heavier traffic, are decreasing, due mainly to improved equipment with greater mobility. It has been impossible to finance high-type paved roads over all the systems. Actually, studies have shown them not justified by light traffic needs, and engineering experts have developed low-cost types giving good service.

In 1929, three-fourths of the 32,522 miles built on the State highway systems was of low-cost construction, such as earth, sand-clay and top-soil, gravel and macadam types. Of the county and local roads, all but 1443 miles of a total mileage of 45,481 were of low-cost construction. The high types in each case were of asphalt, concrete and brick.

Two great factors in the continued progress of the

Every new type of equipment and material will take its place there with the standard types that have been a part of the industry for the past quarter of a century. Among the committee subjects for the St. Louis meeting are grade crossing elimination, highway finance, equipment, location, low-cost roads and bridges, subgrades and pavement bases, airport drainage and surfacing, as well as discussions by the regular city, county and contractors' divisions regarding planning, financing, construction and maintenance.

The American Road Builders' Association held an exposition of all types of machinery and equipment in connection with the congress, with the result that delegates were given a twofold idea of how the United States is accomplishing its rapid extension of road systems with ever-increasing quality and lessened cost. These meetings of men from all parts of the nation and from foreign countries exert a vast influence in forming the highway thought of the public as well as the industry.

The highway industry in 1930 occupies the enviable position of knowing nothing about an industrial depression. A casual glance at future prospects indicates that so long as available funds increase, which will be as long as motor vehicles continue in favor, there will be a parallel increase in road building.

Further Experiences in Nitriding Steel Articles

CONTINUING the symposium on nitriding, which was held in Chicago in September in connection with the National Metal Congress, and at which several papers on the subject were read and discussed, the material in the following columns takes up three of those papers with the discussions which they evoked. In THE IRON AGE of Oct. 9 three of the papers were covered. The seventh paper, devoted to a microcharacter hardness tester, is published separately. It is really a separate topic, but the instrument is of particular interest to those engaged in nitriding or in other methods of producing a hard surface on steel.

Further Investigations in Nitriding

THREE sections comprise this paper by Mr. Serge-son and Mr. Deal. Section I is a discussion on nitriding containers. Section II covers corrosion tests on the nitrided surface; the effect of acids, bases, salt spray, salt water, tap water, oils, atmosphere, etc., are recorded. In Section III the subject of denitriding is discussed, giving the methods and results.

Materials of Construction

EXPERIENCE with welded containers of carbon plate steel has not been satisfactory. In the nitriding process, the carbon steel nitrides and in time disintegrates. After 500 hr. of nitriding in such containers an increased rate of ammonia flow is required to maintain the required dissociation (which should be 20 to 30 per cent). The longer the container is used, the greater the rate of ammonia consumption, the lower the surface hardness of the work and the shallower the case, until a point is reached where, regardless of rate of ammonia flow, unsatisfactory nitriding results.

As the inside walls of the container become nitrided they act as catalytic agents, breaking up or dissoci-

ating the ammonia on the walls. This has the effect of increasing the dissociation and can be counteracted by increasing the rate of ammonia flow. However, as nitriding takes place only when the nitrogen is in the nascent state, it is necessary that the ammonia break up on the work being nitrided. If the ammonia breaks up on the container walls it is probable that the nitrogen will become molecular and inert before it reaches the work.

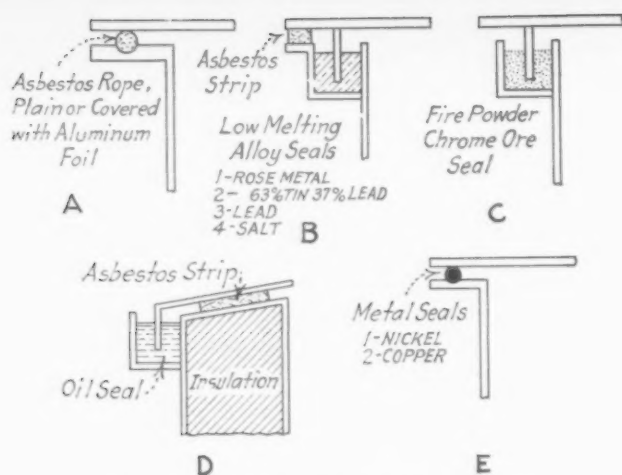
Thus the increase in flow really produces a diluting effect and a considerable part of the nitrogen cannot be used, owing to its becoming molecular and inert on the walls, hence less nitrogen is available for nitriding. If the ammonia flow is not increased, the dissociation will become high, which produces a soft case, due to the reversing of the reaction by the liberated hydrogen. It would appear therefore that an ideal container would be one inert to the action of ammonia at nitriding temperatures.

Containers of Stainless Irons

High-chromium (0.10 C—16.0 Cr) and high-chromium-nickel (0.10C—18.0 Cr—8.0 Ni) have been used. Up to 1000 hr. these containers have given good results. Above this, however, the same trouble arises as with carbon steel containers. Nitralloy steel drillings nitrided in a container when new show an approximate nitrogen content of 8 per cent. After 2000 hr. Nitralloy drillings nitrided under the same temperature and time conditions show only 4 per cent nitrogen. This explains the lower hardness and lower corrosion resistance. Sand blasting the nitrided surface of the container gives temporary relief. Another cure suggested is to heat the container to 1500 deg. F. while passing ammonia through. This again gives only temporary relief.

Monel metal, with low manganese content, has been used up to 1000 hr. and has shown no tendency to

CONTAINERS for use in the nitriding process have to be practically inert to the process if they are not to lose efficacy after a short run. Elaboration of this topic, together with others along the general line of the nitriding process, and its benefits, are carried in the article herewith. This involves among other things consideration of nitriding large pieces and also of furnaces and other equipment for the process.



Sketches of various types of seals

nitride. The dissociation has remained constant, with given rate of flow and temperature. Check runs on nitrided Nitralloy steel drillings show that the nitrogen content is the same on early and recent runs. Satisfactory nitriding is still being obtained. This metal shows much promise, but a longer period of service must be obtained to determine its worth.

Enamelled Surfaces

Enamelled tests of carbon steel, enamelling iron and stainless iron were subjected to various nitriding conditions and temperatures. All hard enamels were excellent at 950 to 1000 deg. F. in that they gave no signs of bubbling, flaking or creeping. From 1050 to 1200 deg. F. most of the enamels flaked or bubbled. Further work is being done on enamels to withstand temperatures up to 1200 deg. F.

For longer life of nitriding containers and low initial cost, the carbon steel container enamelled on inner surface presents excellent possibilities. Monel metal or Monel metal-lined containers, although more expensive, present a second promising material.

Of the methods of sealing the containers, the liquid seals present the most efficient. Low-melting metal alloys should be used where seal is subjected to nitriding temperature and oil where the seal is outside and may be kept cool. A deep seal of powdered chromium ore has shown much promise.

Corrosion Resistance of Surface

ALTHOUGH the nitrided surface is most noted for its hardness and resistance to wear, another property of perhaps equal importance is its corrosion resistance under many conditions. A study of various corrosive agents and their effect on the nitrided case have been made in the laboratory and observed in service. [These tests were described in a somewhat tabulated manner.]

From the results, it is evident that Nitralloy is not adapted for use in acid solutions, such as sulphuric or hydrochloric. It is extremely resistant, however, to alkali, atmosphere, crude oil, ethyl gasoline, natural gas combustion products, tap water and still salt water. While it is slightly attacked in aerated and alternately wet and dry salt water, there also seems to

be no action between it and brass in contact, either still or moving, immersed in hard water.

When the Surface Must Be Denitrided

DENITRIDING of the nitrided case presents an interesting and fertile field for investigation. Applications are known and others undoubtedly will develop where, after the part has been nitrided and in service, a change in design becomes necessary, which requires additional machining. Such would well apply, for example, to core dies in the die casting industry and to forging die inserts and upsetting die inserts. While denitriding and softening for machining can be readily accomplished, renitriding presents serious difficulties in that the denitrided but unmachined parts cannot have their surface hardness materially raised by renitriding.

A review of the work on denitriding clearly points to the following facts:

Denitriding is dependent upon the temperature and time and not the media.

The lower hardness of a denitrided case is the result of an appreciable loss of nitrogen content.

Denitriding at temperatures above 1400 deg. F. is accompanied by a marked diffusion of case toward the center. The rate of diffusion is directly proportional to temperature.

To obtain high or maximum surface hardness by subsequent nitriding, it is necessary to remove entirely all of the denitrided case.

Discussion on Denitriding and Renitriding

DENITRIDING involves raising the temperature of a container to the point of decarburizing. This temperature is such as to cause warping and often the scrapping of highly finished parts, according to one speaker. This fact, however, was reported not to give particular trouble, because finished parts are usually not subjected to such treatment.

Some of the tubes used on small scale nitriding are expected to last for 1000 hr. of operation. The opinion was expressed that, if we could prophesy definitely for each tube that it will last 1000 hr., we would be in much better position than at present. Some tubes go out very quickly, while others may last for years.

Sharp reduction of the resistance to corrosion of a nitrided article was reported when a very fine surface film or skin is removed (say, 0.0005 in. thick). The idea was expressed that the corrosion-resisting factor covers the very merest film on the surface only, and that the removal of this film leaves the article about as before in its resistance to corrosion.

Renitriding after denitriding was discussed with the aid of sketches on the blackboard, two of which are reproduced here. The author has found that, when the original nitriding was done at about 950 deg. F. and it becomes necessary to renitride after denitriding, the hardness comes back without difficulty.

He spoke particularly of taking a rectangular section and grinding off one surface on a 3-deg. slope, so as to run down through the various stages of hardening, and then using such a specimen for renitriding test. As mentioned above, the portions which have

received the smaller amount of hardening, going down the slope of the grind, will take on the full hardening effect when the original and repeat work are done at the normal nitriding temperature.

When, however, nitriding is done at a higher temperature, say 1050 to 1200 deg., the same condition is not met. In the first place, the original nitriding does not give so hard a material. In the second place, the renitriding, under the same conditions as before, follows practically the same curve as that originally experienced, until a point is reached where the first nitriding had practically petered out.

Then, in what might be considered virgin metal, a nitriding effect was produced about the same as if the specimen had not been subjected to the previous treatment. This means that the core was unaffected by the high-temperature nitriding, whereas the areas previously nitrided would not respond well to subsequent repetition of the treatment.

Nitriding the Larger Forgings

PPOINTING out that, one year ago, 300-lb. nitriding charges were the rule, Mr. Higgins stated that today's charges may run anywhere from 10,000 to 15,000 lb. His paper was presented largely in the form of lantern slides, illustrating a wide variety of heavy pieces which his company has subjected to the nitriding process.

Nitriding of steels has increased tremendously in the past year or 18 months, principally on smaller forgings. In the past year the designing engineer has reached out and become bold enough to try forgings of a weight and design never before attempted. As a result, it is not unusual today to nitride forgings weighing from 100 to 3000 lb.

From the practical standpoint, there is no difference in the method of nitriding large forgings from the nitriding of the small forgings. The same procedure is followed, and almost invariably the same results obtained.

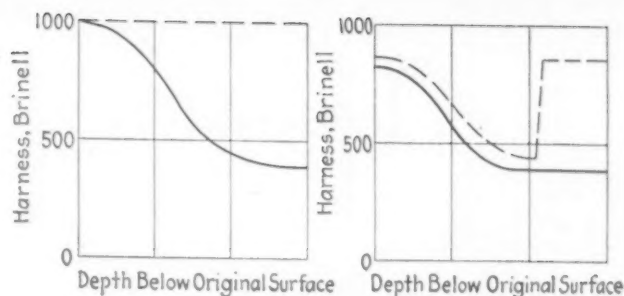
Preparation of Materials

It is obvious, however, that more care must be exercised in the selection of steel and preparation of the larger forgings. Large blooms are more difficult to obtain free of detrimental inclusions which, when present, will interfere with the strength of the core and the uniform hardness of the case. Internal strains in forgings are ever present and more so in the larger sizes. These strains, in many cases, require as many as three normalizing treatments before the final finish machining can be accomplished without distortion.

Extreme care must be exercised in piling large forgings in the nitriding box; forgings should be supported on v-blocks, equally spaced, to prevent sagging. This is of the utmost importance. Even though a distorted forging can be straightened, the question is ever present—will it remain straight and give the satisfaction expected of it in service?

Summary of Observations

Nitriding of large forgings can be accomplished with every degree of safety and satisfaction experienced on small forgings. Care must be used in selec-



At left is the relative hardness as depth below surface decreases, when nitrided at 950 deg. At right, the solid line gives result at 1100 deg. Dotted line, renitriding after 1100-deg. nitriding, shows core unaffected by high-temperature work

tion of material, forging, heat treating, machining, normalizing and piling in the box.

Growth appears to be progressive in forgings ranging in size from 3 to 12 in. in diameter. It is approximately 0.00025 in. for the smaller size to 0.002 in. for the large size.

No distortion is present if materials are carefully prepared. The close temperature range in the box assures uniform hardness throughout.

Possible uses of nitrided steel are limited only by the boldness of the designer and the vividness of his imagination. Whether or not its application to a particular service is practical can be determined only after a thorough engineering discussion. Even this discussion may not clear all minds of doubt, in which event, trial in service is well worth making. If the steel is a success, it is a big success. Hence any timidity or hesitancy, or any condemnation of the process on account of its newness, is not warranted, in view of the possible or probable gains.

Discussion of Nitriding Large Forgings

MECHANICAL strains in pieces subjected to nitriding at 950 to 1000 deg. F. are likely to be relieved during the nitriding process, according to one speaker. This means that such distortion as we find following the nitriding process is perhaps due, more than anything else, to the previous condition of the piece on which the work was done, insofar as internal strains are concerned. For this reason it was suggested that normalizing, to get rid of these strains, should be the practice, preceding nitriding.

Mr. Sergeson called attention to the fact that Mr. Higgins's furnace is the first large nitriding unit he knew of which is fired with oil. Usually gas or electricity is used for heating furnaces for this purpose.

He called attention to the fact that the growth in an object being nitrided seems to be about equal in various solid sections, regardless of the size. Thus, a round bar with 2-in. diameter will expand about 0.002 in. in 80 hr. and a 5-in. round will expand the same amount in the same time. This question of growth was touched on in the closure when Mr. Higgins said that he found a direct and progressive growth on solid forgings which could be pretty well predicted in advance. But with rings or bushings

(Continued on page 1199)

Kodak Company Uses Motion

By J. B. NEALEY

American Gas Association, New York



AUGMENTING written and oral specifications of intricate operations, the motion picture is now being used in industry to portray these details graphically. It has been found that a motion picture will convey the method of doing a job quicker and more completely than a typewritten or verbal instruction. It can, therefore, be used to advantage to supplement engineering specifications on blueprints, of tools and materials, feed, speeds and similar data.

A pioneer in the use of motion pictures in this field, and manufacturer of the equipment used, is the Eastman Kodak Co., Rochester. Recently this company has been extending its plant facilities in foreign countries for the manufacture of Kodaks and other cameras, film, etc. In tooling these plants for production, special written specifications and instructions were prepared for each operation.

However, for international use, it was found that such special instructions and specifications were of limited value. Difficulties occurred through lack of exact equivalents in translation, especially with technical shop terminology. Hence it was found advisable to make motion pictures of each machine while in operation.

This was done, one

long film being used for a number of machines, and suitable captions being interspersed to identify the different operations with the written specifications. This film, projected in the foreign plant, gave the foremen and operators an immediate and a comprehensive grasp, not only of the equipment and general method of manufacture, but also of the essential details, and proved an invaluable aid.

In general, the plan used in these pictures was to show first a title which identified the operation and "keyed it" into the written specification, followed by a "close-up" of the material or part before and after the operation in question. Following this a title was used to give briefly the material and equipment data. A long shot of the operation cycle was then given, to show the arrangement and layout, followed by a close-up of the principal cycle to show the details.

How the Operations Were Visualized

Details of manufacture of the 16-mm. reels for the Ciné-Kodak will serve to show how this idea is carried out. It will require little imagination to grasp the great value of visual instruction through motion pictures, in contrast with the difficulty of getting a quick and comprehensive grasp of all these details as covered by the following description:

The side disks or flanges are made from aluminum blanks. The first operation is to trim to size and perforate the round or square hole in the center. This is performed on a Bliss 21 punch press, the seated operator filling a tray on the front of the press from the original packing case and feeding from the tray.

Air blows the trimmed and perforated blank through a chute into a tote box at the rear of the press, while the scrap is blown into a box at the left of the press. All presses in this division are equipped with non-repeat mechanisms and guards which swing across

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WHEN the shoemaker sticks to his last his results are likely to be worth while. This is precisely what a manufacturer of motion picture equipment has been doing in transmitting instructions for operation of machinery in its foreign plants. Motion pictures form a large part of the instructions—

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Pictures to Instruct Mechanics

in front of the dies when the press is tripped, to push operators' hands away should they be a little slow at any time. The non-repeating device consists of a safety clutch which will not allow the press to repeat, no matter how long the treadle is held down.

Operation 2. Stamp and pierce flange in Bliss 19, the blanks being in tote boxes on high-lift trucks to left of press, while the finished blanks are blown through chute into tote boxes at the rear.

Operation 3. Burr flanges in Bliss 19.

Operation 4. Emboss flanges in Bliss 19.

Operation 5. Blank hub in Bliss 19 inclinable. The material is the same as for the flanges, with gray finish, except that it comes in flat sheets 1 11/16 in. x 74 in., 28 sheets making 1000 pieces. Operator feeds press from original packing cases, and disposes of scrap to floor on the left, while the blanked pieces drop through the press into trays on the floor.

Operation 6. First, form hub in Bliss 19, the formed pieces being blown into trays in the rear through a chute.

Operation 7. Second, form hub in Bliss 21.

Cleansing the Parts After Forming

Operation 8. Washing consists of putting the parts through a combination washer and dryer of sheet steel, about 30 ft. long and 3 ft. wide. It is divided into three parts, washing, rinsing and drying, the drying compartment being heated with gas burners. The whole is equipped with a traveling chain conveyor which protrudes from each end to form loading and unloading tables. Another chain-type conveyor runs parallel and close to the main conveyor in the washing compartment, and the parts are held, between the two, from being knocked about by the sprays.

A solution of caustic soda, 2 1/2 lb. to 50 gal. of water at 160 deg. F., is pumped through nozzles to

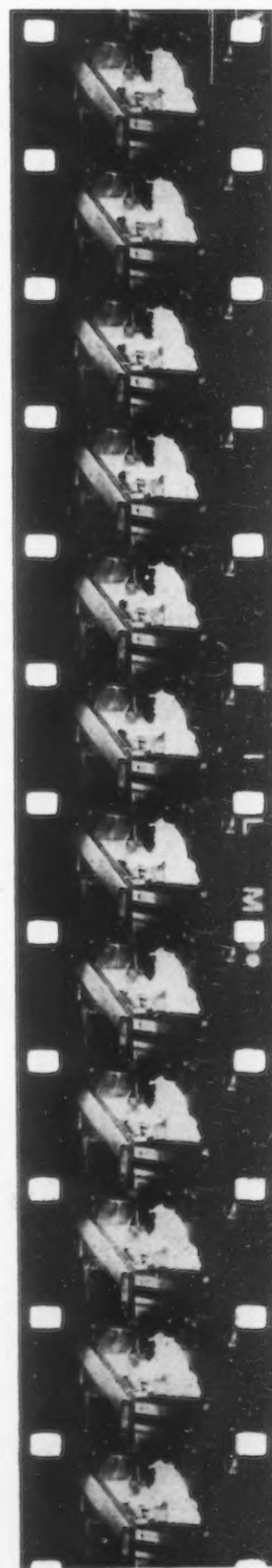
form the sprays. Clean water at 150 deg. F. is used for rinsing. Jets of air from perforated pipes blow off excess water and six gas burners keep the drying section at 450 deg. F. For the tops and bottoms of the reels a solution of sodium cyanide is used as a rinse.

Operation 9. Bench assembles one flange to hub. This is performed manually at a bench by a girl operator.

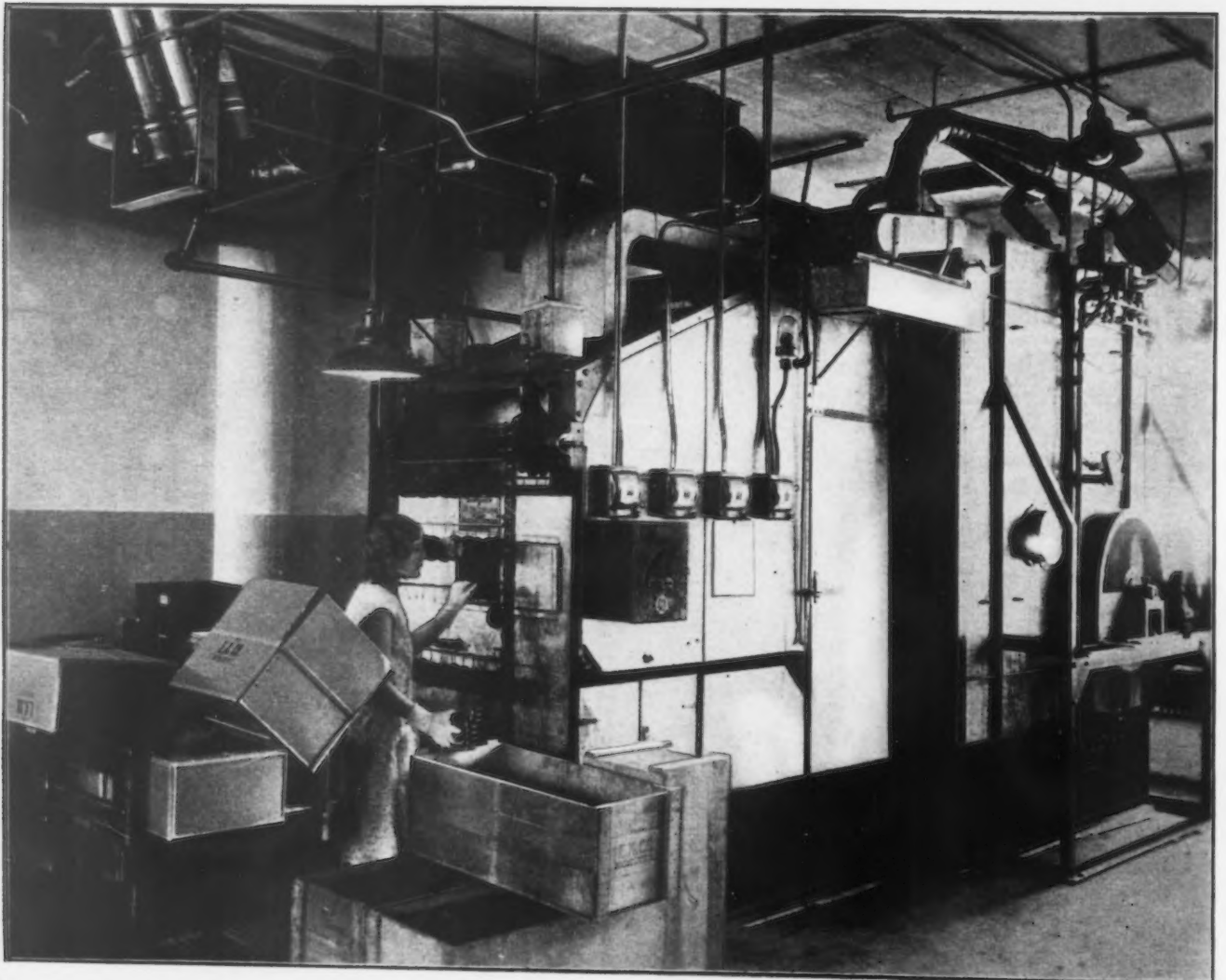
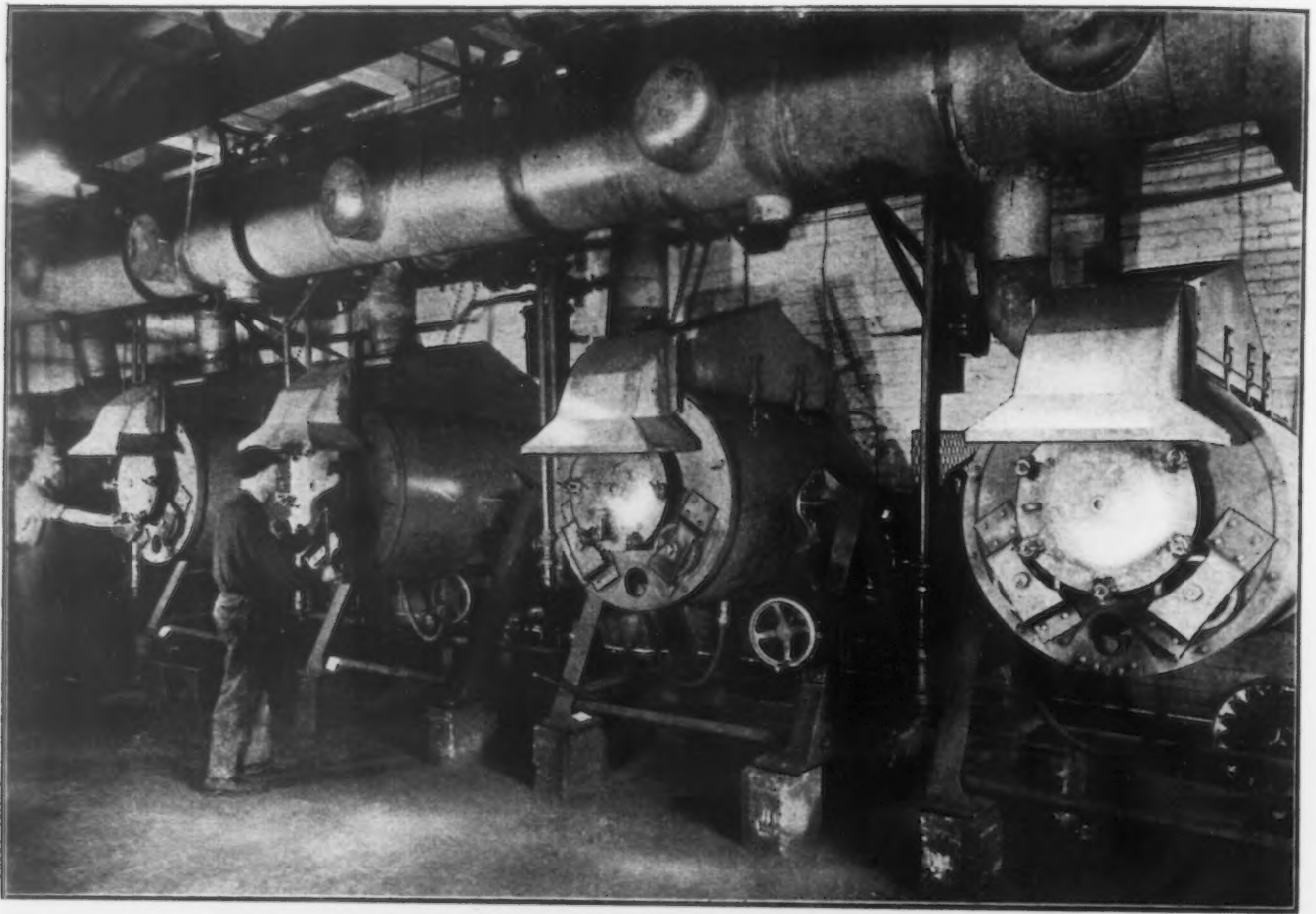
Operation 10. Spray inside hub and flange with special Ciné black paint.

Operation 11. Spray inside round hole flanges. In this operation a spray hood outfit equipped for two girls is provided, which includes gun-type sprayers, trays, masks, etc. The air pressure for the spray is 75 to 80 lb., and the 5-gal. tank is under a pressure of 25 to 30 lb. The hoods are provided with gages showing pressures from tank and spray lines. Operator secures hub and flange from tray, positions mask, sprays and disposes to tray on portable bench at side of hood.

The parts are baked after being sprayed. The whole setup of spray booths and bake ovens is in a single room built specially for these operations (12 and 13). Five spray booths are placed along two walls and five ovens along the others. All paint-laden air from the sprays is drawn through excelsior-lined



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showing, as they do, just how the job should be done. This article tells how they are used and gives an idea as to the purposes and results. Decorations on these pages are made up from moving picture strips used in this educational work. They represent various operations involved in making Kodak parts.
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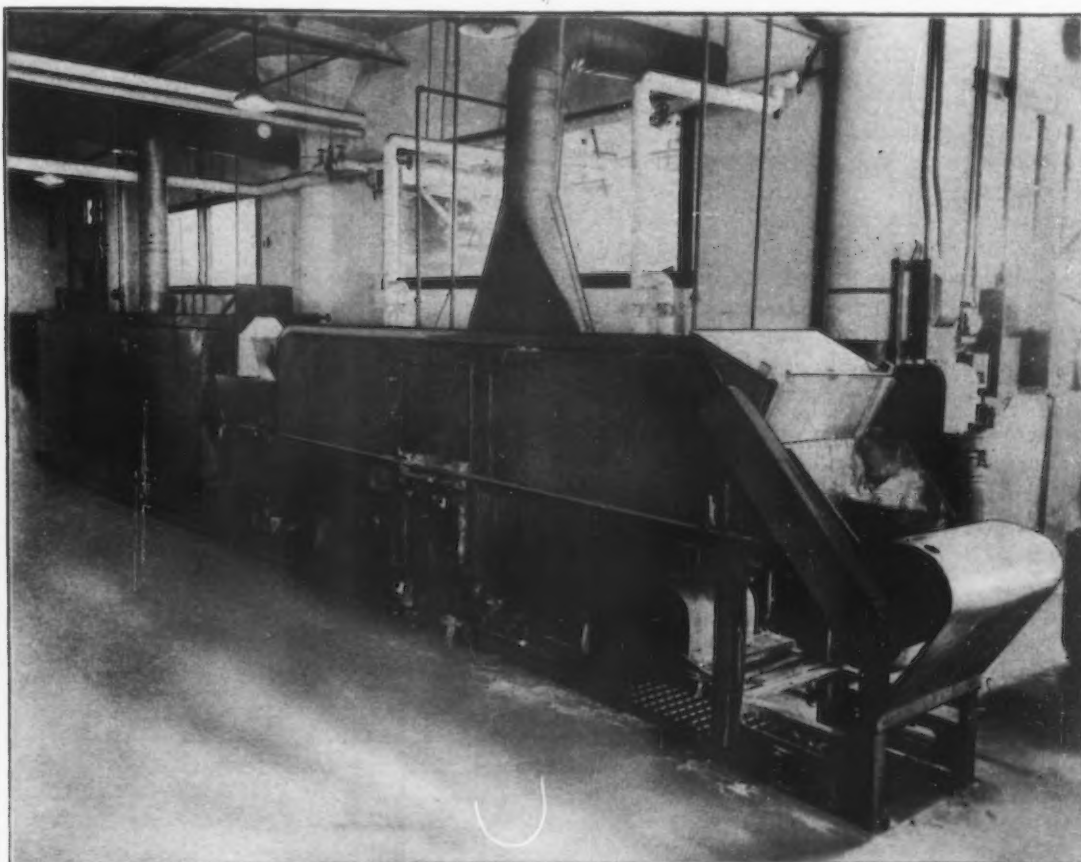


partitions in the hoods by motor fan and exhausted outside the building. The excelsior absorbs the paint. Fresh air is sucked in from the outside by another fan and distributed throughout the room by a duct with eight openings.

There are four periodic ovens and one continuous type oven, all of sheet metal construction and heated with gas fuel. The continuous oven, which is used for

wired to a motor-operated, two-position valve in the gas supply line. There is also a recording pyrometer of the disk type. The baking interval is 2 hr. and capacity is for 6000 pieces in 8 hr.

Safety devices of all kinds are used, including two Foamite bottles just in front of and above the oven, which are equipped with fusible links. In case the oven or room temperature rises above the limit, the



CONTINUOUS gas-fired oven (bottom, p. 1130) for dipping and baking japan on Kodak parts. They pass through on rods carried by the two side chains. Fire extinguishers at top of picture are connected for automatic operation in case of trouble.

Battery of rotary carburizing furnaces (top, p. 1130) fired with gas.

Continuous washer and dryer (above)—washing element, rinsing element and gas-fired drying element.

parts that can be dipped instead of sprayed, is about 15 ft. long, 10 ft. high and 4 ft. wide. It is equipped with two parallel chains with rods suspended between at short intervals. This conveyor rises from the bottom to the top on the outside of the oven before it enters, this portion being exposed for convenience in loading and unloading. Inside the oven the conveyor descends and rises 7 times on a series of rollers, returning to the loading end in a separate compartment at the bottom. It is operated by a $\frac{1}{2}$ -hp. motor through a speed-reduction gear train.

Heat is supplied by two atmospheric gas pipe burners located close to the bottom and extending almost across the oven. A temperature of 400 deg. F. is automatically maintained with a temperature controller

links let go and the Foamite is sprayed over the booths and into the oven. At the same time all the fan motors and air circulation are stopped automatically. Furthermore, if the motors of the fans exhausting the products of combustion from the oven should fail, the gas supply is automatically turned off by a solenoid valve. Pilot lights are supplied to keep the burners going when the gas supply is on, and this gas supply cannot be turned on until the pilots have been lighted.

Operation 14. Final assembly of the reel is accomplished on a Bliss 19 with two dies. The operator secures a hub and square hole flange and positions on die, places jig around hub, puts round hole flange on jig, trips press for assembly, moves reel with jig left
(Concluded on page 1200)

Special Information Obtainable from Mechanical

LET us refer to the four classes of accounting work: historical, analytical, critical and constructive. In many cases records of each class may satisfy the demands made on them from the other classes. In other words, a record primarily historical can at once be analytical, critical and even constructive. Records so designed are very valuable to management and are inexpensive to compile and maintain. The use of mechanical sorting and tabulating equipment makes it comparatively simple to obtain information that we may say falls in a new class, a so-called combination or all-inclusive class.

A description will be given of several records that have proved of great value in a machine shop, and should apply particularly to all shops manufacturing machine tools or similar products.

Burden Report

IT has been conceded by most accounting authorities that the production center or machine-hour rate of burden application is about the most consistent for machine shop practice. This theory applies a definite rate for each machine in the shop, or for each group of similar machines in a definite department. It therefore becomes

*The article in our issue of Oct. 2 explained how the original accounting information comes into being and the mechanical methods by which it is prepared for analysis.

important that the shop management know to what extent the burden is being consumed by each machine or department.

The first step in burden distribution is the allocation to a given piece of equipment of all expenses which have a bearing upon the use of that piece of equipment. Then the normal hours that the machine or department can be expected to work are divided into the expense and the normal rate is obtained. On Form 1, the columns headed "Normal" show these normal hours and the normal total burden for these hours. In the second column, headed "Used," are entered the actual hours worked and the actual normal burden on those hours. In the last column, the "Under or Over Absorbed" hours and burden are shown, which is the

DEPARTMENT OR EQUIPMENT	NO.	NORMAL		USED		UNDER OR OVER ABSORBED	
		HOURS	AMOUNT	HOURS	AMOUNT	HOURS	AMOUNT
Engineering	3	368.5	276.38	526.3	394.79	157.8	118.41
Raw Stock	4	39.6	27.72	27.3	19.11	12.3	8.61
Tool Room (Man Hour)	6	562.8	731.64	607.1	788.40	44.3	56.76
Machine	652	31.2	40.56	10.0	13.00	21.2	27.56
Millwright	7	192.0	115.20	107.7	64.62	84.3	50.58
Blacksmith (Man and Furnace Hours)	8	257.6	90.16	48.4	16.96	209.2	73.20
Shipping	9	168.0	168.00	185.3	185.30	17.3	17.30
Planer No. 10 Machine	1	39.6	211.86	115.0	615.75	75.4	403.89
"	2	39.6	174.24	60.4	265.76	20.8	91.52
"	11	39.6	69.30	33.6	67.55	1.0	7.55
"	29	39.6	75.24	31.6	60.04	8.0	
"	38	39.6	64.30	47.6	83.32	8.0	14.02

Form 1—By means of the burden report control of operations is visualized and good results are made easier to obtain

DEPARTMENT NAME	DEPT. NO.	ACCOUNT NO. 51			ACCOUNT NO. 53			ACCOUNT NO.			ACC.
		HOURS	PAY	BURDEN	HOURS	PAY	BURDEN	HOURS	PAY	BURDEN	
General Shop	1										
Engineering	2	229.8	281.42	172.24							
Raw Stock	4	12.8	9.95	9.56							
Finished Stock	5										
Tool Room	6	42.9	26.92	55.77							
Millwright	7	81.4	50.44	54.50							
Blacksmith	8	28.0	14.27	9.82							
Shipping	9	61.5	36.17	61.50							
Planer	10	52.4	246.39	176.60	27.6	12.74	38.67				
Engine Lathe	11	154.8	108.54	160.71	16.6	11.12	24.58				
Milling Machine	12	169.0	80.53	202.10	40.1	20.43	72.13				
Lathe	13	170.1	106.10	455.02	13.6	10.15	17.68				

Form 2—Direct labor analysis by departments against account numbers

By THOMAS B. FRANK*

Treasurer, Cincinnati Planer Co., Cincinnati

Accounting

difference, plus or minus, between the actual hours and burden and the normals shown in the first column.

Cards Show Efficiency of Departments

Information in the "Used" column is obtained directly from the weekly job time cards of direct or productive labor, by mechanical tabulation. The cards are sorted on the sorting machine by departments, and by machine or equipment numbers, where rates for individual machines have been determined. They are then placed in the tabulator. As the total figures for any department or machine appear, they are copied to the report form shown. This report is very valuable to the shop management, as it shows at a glance the

WHEN a special report on an unexpected topic regarding a business is wanted, it usually is wanted in a hurry. Unless, however, a plant is equipped with the proper type of apparatus whereby the report can be had promptly, many laborious hours may be expended before the result is attained. This article shows how one company makes use of its tabulating equipment for these special reports. The suggestiveness lies in the fact that new uses are continually being found for the equipment, and that much information is now available which heretofore could not be obtained at reasonable expense.

productivity or efficiency of all departments and machines.

Thus, for example, let us take machine Number 693:—The report shows that it was run only 10 hr. out of a normal possible run of 31.2 hr., leaving an unabsorption of 21.2 hr., the burden cost of which is

\$27.56. What caused the non-use of this machine? Was it lack of work, a breakdown, inefficiency of the foreman, improper planning or supervision, or possibly unbalanced production?

This report places at the disposal of the shop manager the vital statistics of his shop. It keeps his fingers on the pulse of production; it enables him to see the effect of various plant policies. Above all, it shows him the cost in dollars and cents of the idleness of each piece of equipment or of each department. It also shows him the overload on any machine or department caused by over-

Form 3 — Analysis of indirect labor costs, by departments, to various accounts

DEPARTMENT NAME	DEPT. NO.	ACCOUNT NO.	HOURS	PAY	ACCOUNT NO.	HOURS	PAY	ACCOUNT NO.	HOURS	PAY	ACCOUNT NO.	HOURS	PAY	ACCOUNT NO.	HOURS	PAY
General Shop	1	219	31.94													
Engineering	2															
Raw Stock	3															
Finished Stock	4															
Tool Room	5				22.7	18.96										
Millwright	6															
Blacksmith	7															
Shipping	8															
Planer	9				45.0	59.00										
Engine Lathe	10				9.2	8.00										
Milling Machine	11				15.3	18.45										
Drill Press	12				17.0	14.41										
Boring Mill Erection	13				8.0	8.67										
Painting	14				1.0	1.12										

Form 4—Classes of orders analyzed by departments

DEPARTMENT NAME	DEPT. NO.	JOBS			REPAIRS			STOCK ORDERS			NO.
		HOURS	PAY	BURDEN	HOURS	PAY	BURDEN	HOURS	PAY	BURDEN	
General Shop	1										
Engineering	2	12.7	12.45	95.42	19.6	20.04	14.71				3
Raw Stock	3				5	3.2	3.5	12.3	8.66	9.81	
Finished Stock	4										
Tool Room	5	11.2	8.25	14.82				2.5	2.45	4.51	13
Millwright	6	57.4	34.12	40.10							
Blacksmith	7	2.7	9.8	9.5				14.4	7.86	10.5	
Shipping	8	31.9	18.43	31.70	15.9	9.85	15.90	7.27	4.908	2.44	14
Planer	9	26.8	18.59	103.12	25.4	16.87	48.45	53.2	58.38	86.87	
Engine Lathe	10	34.4	20.60	36.10	4.7	2.91	4.26	8.86	43.59	12.708	
Milling Machine	11	36.3	15.74	44.27	6.7	2.47	7.69	24.2	14.22	5.923	

time work. (See machines Nos. 1 and 2 on Form 1.)

With a report of this nature on his desk every week, the shop superintendent, or even the foreman, has a means of feeling the pulse of the shop. With the facts clearly shown them, they can take the necessary steps to correct conditions that tend to increase costs, slow up production or cause other troubles common to machine shops. The total of the "Used" column for burden amount becomes the figure for bookkeeping entries of absorbed burden.

Direct Labor Report

MOST accounting systems in use in machine shops provide for a symbol or number for all expense account classifications. Each week expenses or production is charged with the cost of the production of the shop. To facilitate compiling such charges, a form such as Form 2 may be used. The departments responsible for the production, or to which the expense is to be charged, as the case may be, are shown at the left. The columns are headed according to the account number to be charged. The example shown indicates in the first column direct labor expended on orders chargeable to Work in Process. The other columns are charges to expense accounts of direct labor charges for work done for the internal consumption of the shop, such as tool maintenance, etc.

For analysis of departmental production the hours, pay and burden are shown separately. From a study

of this information, compared with reports for other periods, a complete picture of the activity of each shop department may be obtained, with the benefits of control resulting from accurate complete information.

Thus, in Department 12, it will be seen that 169.0 hr. were spent upon salable production and 40.1 hr. on small tool maintenance. This would indicate a gross disproportion for a productive department, and the causes thereof should be investigated and corrective measures adopted immediately. The totals of each column furnish the bookkeeping department with information necessary to complete entries to the expense and inventory accounts for the payroll disbursement for labor. It is in fact a departmental analysis of the direct labor payroll.

Indirect Labor Report

FORM 3 is similar to the Direct Labor report, except that on it is reported only the departmental charges for indirect labor, such as supervision, foremanship, instruction, labor and helping, time-keeping, stock-keeping, and other miscellaneous shop clerical work, etc. The charges are entered against the department responsible for the work. In other words, the charges are made to the department chargeable for the work done. The totals of the columns are again the source of information to the bookkeeper for payroll distribution entries.

FORM 74

MAINTENANCE ORDERS DEPARTMENTAL ANALYSIS

Month of MAY - - 1930

DEPARTMENT NAME	DEPT. NO.	ACCOUNT NO. <u>✓44</u>				ACCOUNT NO. <u>✓48</u>				ACCOUNT	
		HOURS	PAY	BURDEN	MATERIAL	HOURS	PAY	BURDEN	MATERIAL	HOURS	PAY
General Shop	1	✓5	286	801							
Engineering	2										
Raw Stock	4	27	138	351							
Finished Stock	5										
Tool Room	6	499	3179	✓773	✓100						
Millwright	7										
Blacksmith	8										
Shipping	9										
Planer	10	606	4081	3250	11391						
Engine Lathe	11	305	1821	✓613	370						
Milling Machine	12	194	1094	2522	05						
Drill Press	13	132	825	1654							
	14										

Form 5 — Departmental analysis of maintenance orders

Form 6—Defectives have their own analysis, both by labor and material and by department

FORM 75

DEFECTIVE LABOR AND MATERIAL ANALYSIS -- BY DEPARTMENTS

Month of MAY 1930

DEPARTMENT NAME	DEPT. NO.	DEFECTIVE LABOR SS1				DEFECTIVE MATERIAL SS11			
		HOURS	PAY	BURDEN	MATERIAL	HOURS	PAY	BURDEN	MATERIAL
General Shop	1				2608				
Engineering	2				422				
Raw Stock	4				12				
Finished Stock	5								
Tool Room	6				120				
Millwright	7								
Blacksmith	8				221				
Shipping	9								
Planer	10				2023				
Engine Lathe	11	50	234	✓153	2029				
Milling Machine	12				15191				
	13								

The shop management at a glance can pick out any increases in indirect labor and check the causes. It serves as an excellent check-report against which to plot the results of economy programs. In fact, it serves as a stimulant for a continuous "savings-campaign."

Class-of-Order Report

IN many small shops it is not practical or expedient to keep elaborate records in the office of work planned ahead for the shop, work for each machine or each man. However, there is a need for some control of the work. This may be obtained to some degree by the use of the "Class-of-Order" report, Form 4. All of the job-time cards are again sorted by departments and by the class of orders, whether they are Job Orders, Repairs, Stock Orders, Tool Orders, Lot Orders, Maintenance Orders or Account Number or Expense Charges.

This gives the shop management at a glance the results of the week's work in each department of the shop. It shows the exact amount of work turned out by each department in hours, labor pay and burden. The ratio of productive, salable work to other classes of work may be readily seen. Thus, if one department is spending an unusually large number of hours on work chargeable to Account Numbers, and only a small proportion to regular production for sales, the plant manager may take such action as seems necessary to change the condition.

Other uses of this report may suggest themselves from time to time. The report makes a complete statistical analysis of the payroll each week, and the figures shown thereon, plotted on a graphic chart, make a very interesting as well as instructive piece of information for the general manager. It is to be borne in mind that all of these reports are made up directly from the job-time cards each week by means of mechanical sorting and tabulating equipment. The various sortings of the cards are completed at the rate of 400 a minute and tabulating and adding at the rate of 90 cards a minute. It is therefore evident that the cost of obtaining these reports is negligible, compared with the benefits to be had from the information obtained.

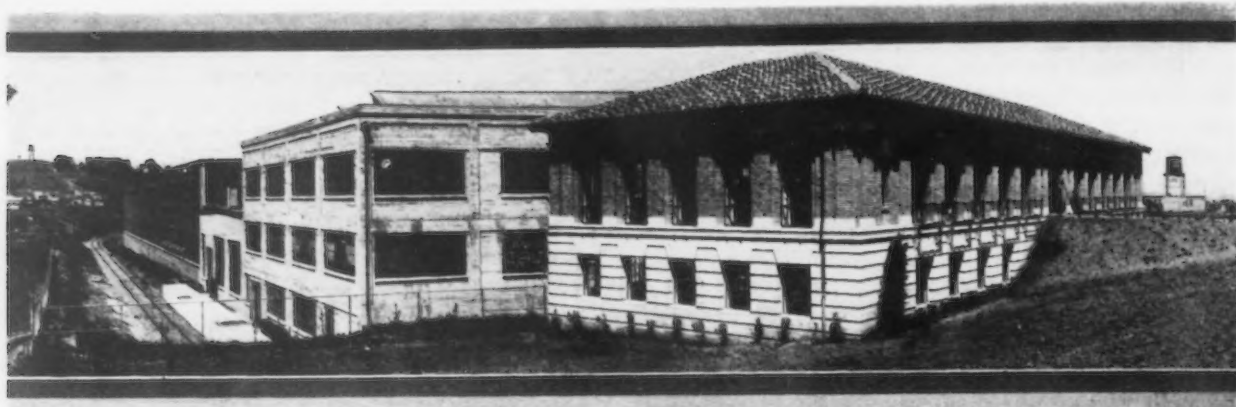
DEPARTMENT NAME	DEPT. NO.	✓31 ACCT. NO.	✓32 ACCT. NO.	✓33 ACCT. NO.	✓34 ACCT. NO.	✓35 ACCT. NO.	✓36 ACCT. NO.	✓37 ACCT. NO.	✓38 ACCT. NO.	✓39 ACCT. NO.	✓40 ACCT. NO.	✓41 ACCT. NO.	✓42 ACCT. NO.	✓43 ACCT. NO.	✓44 ACCT. NO.
General Shop	1								4.57	16					
Engineering	2								4.57						
Raw Stock	3	12.58	48						96						
Finished Stock	4									23					
Tool Room	5	68.96							12.10					1.20	
Millwright	6		1.00						30.76	29	25				0.5
Blacksmith	7	2.49					9.00	7.2							
Shipping	8														
Planer	9	3.25	14.75						6.36	34					
Engine Lathe	10	33.46							8.39						
Milling Machine	11	1.17	95						3.09						10.00
Drill Press	12	4.07	76						1.20						
Boring Mill Erection	13	50							36						
Painting	14	3.09		194.50					3.57						
Rail Assembly	15	10.26	50.2						16.28						
Polishing	16								5.49						
Planer Erection	17	28.34	26.87						14.56						
Purchasing	18														
Timekeeping	19														
Inspection	20														
Group Assembly	21	6.35	7.08						30.7						
Scraping	22								24						
Countershaft	23														
Gear Cutting	24		12.78						1.20						
Casting Cleaning	25			16.0											
Horizontal Boring Machine	26	2.41	57						1.68	2.00					
Vertical Boring Machine	27								24						
Grinding	28	69.62	3.75						1.61						
Screw Machines	29								24						
Chucking Lathe	30	76							9.7						
Matching	31														
G-R Assembly	32	6.56	12.16						4.72						129.02
Welding	33								4.76						
Tabulating	34														
Lunch Service	35														
Tool Room	36	42.64							1.20	6.1					
		716.81	813.7	196.43	9.00	138.31	4.48	25	1.20	129.02					

Form 7 — Expense requisitions for another item subjected to close analysis

Where the punched-card system is employed, various monthly reports may be made up, with a minimum of time and effort, which will at once furnish all the necessary information for the bookkeeping and cost departments, and serve as an executive report as well.

Monthly departmental analyses and distribution of Maintenance Orders (Form 5), Defective Labor and Materials or Spoilage (Form 6), and Expense Requisitions (Form 7), are very valuable to management in exercising control of expenditures. The analysis of maintenance orders shows the hours, also the amounts of labor pay, burden and materials, expended on maintenance for each department of the shop. The management is thereby enabled to ascertain which departments are kept in the best running condition, and can pick out at a glance those that

(Concluded on page 1201)



Manufacturing and Warehouse Unit for Link-Belt Coast Trade

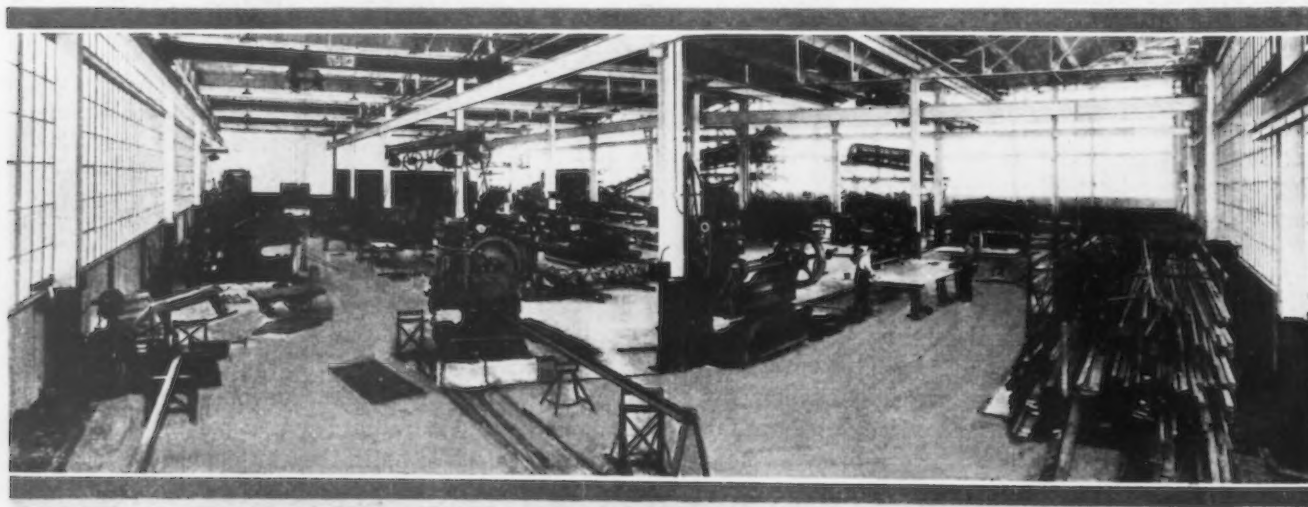
SAN FRANCISCO'S manufacturing facilities have recently been given an important addition as the result of completion of a new manufacturing plant by the Link-Belt Co., Chicago. This development is the outcome of long standing and carefully laid plans for a plant of adequate size to take care of both manufacturing facilities and adequate stocks for the Pacific Coast trade.

The new plant was not built as an expansion, but rather to provide greater erection and aisle space and more room for storage of materials in process, as well as for completed stock. It also provides better working conditions for the employees. All manufacturing operations are located on the first floor and the layout in construction of the plant has been carefully planned to permit future expansion as the growth of business justifies.

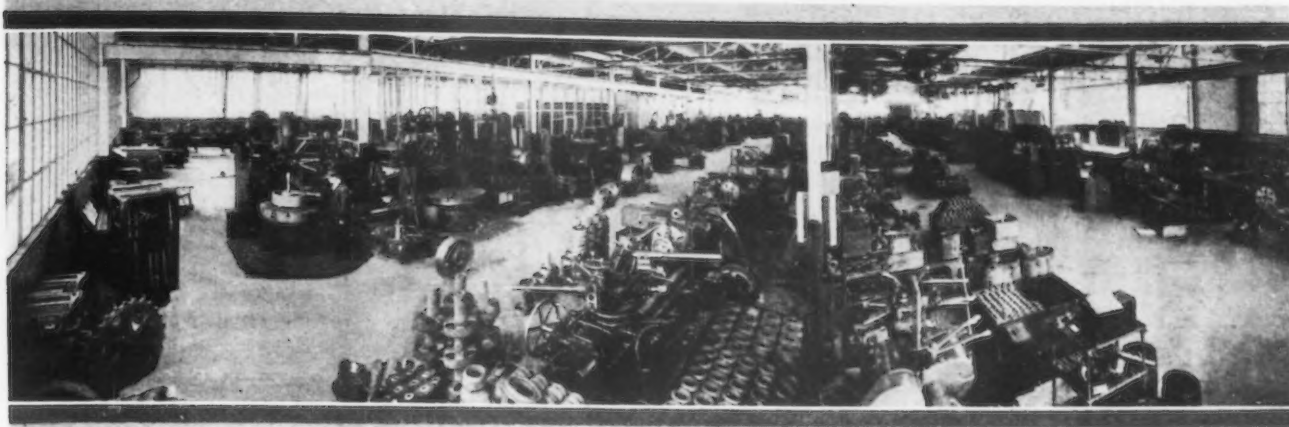
The new buildings are located on a 7½-acre tract which is within 15 min. trucking distance of downtown San Francisco. Highways leading to the plant are exceptionally well located for trucking and a railroad switch track is convenient to the new unit.

Of modern Spanish design, the office building houses the administrative offices, sales, advertising, purchasing, accounting, engineering and other departments, and an assembly hall for general meeting purposes.

Back of the office building, before the manufacturing building is reached and connected by a passageway, is the warehouse, which is a three-story concrete structure, 80 ft. x 120 ft. The first floor of this structure is at a level with the floor of the manufacturing building and shipping room, and the second floor at a level with the main floor of the office building. The



At the north end of the manufacturing building, space is provided for a steel shop



Wide aisles lead from the machine shop to the main manufacturing building, which is in the right-hand background

floor area of the warehouse building is 28,800 sq. ft.

Between the warehouse building and the manufacturing building is located the shipping room, which is served by the spur track on one side and a driveway for trucks on the opposite side. Beyond this structure is the manufacturing building, containing machine shop, steel shop, plant office and their auxiliary departments. This structure is designed with a high crane bay 50 ft. wide and 300 ft. long. The heavy-tool section of the machine shop is located at the south end of this bay and the steel shop at the north end.

For its entire length this building is served by 10-ton double-girder cranes, while smaller cranes and hoists are located at various focal points throughout the building. Heavy materials may be picked up by the cranes at any point in the length of the building and carried to the shipping room for loading out by truck or railroad cars, or they may be transported to the north end for direct loading on cars. To the east of the high bay is

the light-machine section, with five transverse bays occupying a total area of 150 ft. x 200 ft.

Castings are brought in by truck and unloaded at the east doorway. The flow of work is from the doorway through the various operations and then either

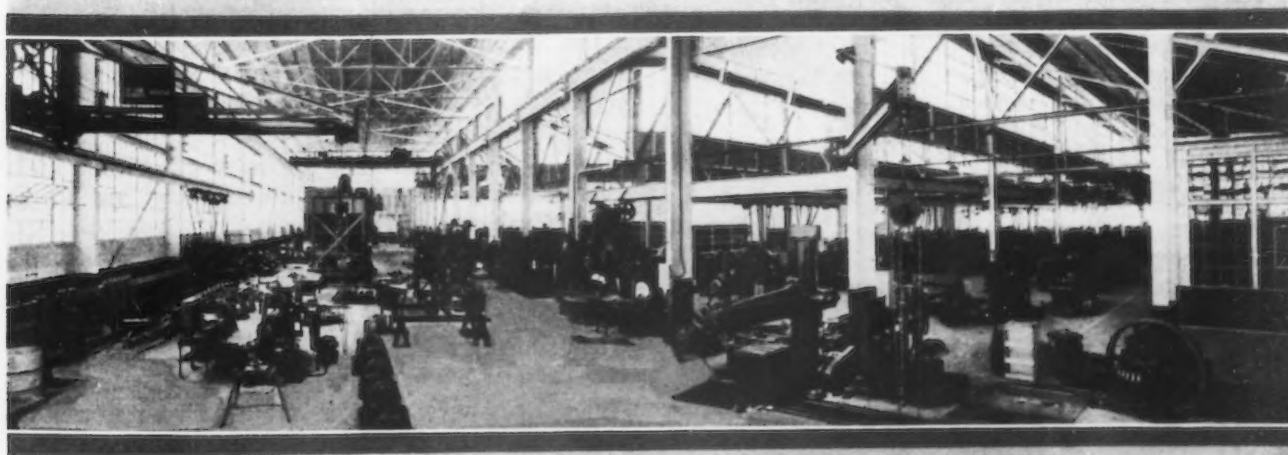
to the high bay for assembly or to the shipping room or warehouse. Heavy castings routed to the large-tool section of the machine shop are handled by the 10-ton crane and carried direct to the machines. At the north end, paralleling the high bay, and with north saw-tooth skylights, are three 30-ft. bays, 150 ft. long, for the lighter work of the steel shop. Plates, shapes and bars arrive here in cars which are set inside the steel shop under the crane.

The new plant offers exceptional opportunities for use of modern manufacturing methods. Facilities for handling incoming materials are strictly up-to-date. Work in process flows in logical channels and storehouse and shipping facilities are ample to meet the most exacting requirements of the shop.

▲ ▲ ▲

TO take care of manufacturing facilities, and also adequate stocks, on the Pacific Coast the Link-Belt Co., Chicago, has completed a new plant in San Francisco. This plant has a number of worthwhile features of design and construction which are brought out briefly in the adjoining paragraphs.

▼ ▼ ▼



Machine tools are spaced so that products being manufactured move easily through wide aisles



Forging Steel and Steel for Oil Well Casing

MANUFACTURE of forging steel in the basic open-hearth furnace was the subject of a paper that aroused much interest at one of the sessions of the Iron and Steel Division at the fall meeting in Chicago of the American Institute of Mining and Metallurgical Engineers. The author was W. J. Reagan, Edgewater Steel Co., Oakmont, Pa. Another paper of almost equal interest was devoted to the development of alloy steels of increased strength for casing for deep oil wells. This author was F. W. Bremmer, assistant superintendent of hot mills, Spang, Chalfant & Co., Inc., Ambridge, Pa.

Mr. Reagan's paper was "Practical Observation in the Manufacture of Basic Open-Hearth High-Carbon Killed Steel." He pointed out that the making of basic open-hearth steel for rolled steel wheels, locomotive tires, carwheels and forgings of various kinds is a highly specialized industry. Increase in weight of rolling stock and the high speed now demanded of transportation necessitate the use of steel of the highest quality for these purposes. The writer had studied defects in basic open-hearth steel and the results obtained on such defects by changes in open-hearth practice.

Bottom-Cast Steel in 12-Sided Ingots

Basic open-hearth steel so used has 0.50 to 0.85 per cent carbon, 0.04 per cent maximum phosphorus and sulphur, 0.15 to 0.35 per cent silicon and 0.50 to 0.75 per cent manganese. The steel is bottom cast in 12-sided ingots of standard 88-in. body and 14-in. hot top lengths, but varying in diameter from 13 to 30 in. Ingots for special forgings are made in molds of various sizes and designs. These are sliced cold into blocks of various lengths, depending on the forgings to be made. This affords good opportunity

for inspection. Heats are tapped into two ladles through a bifurcated spout, which gives an opportunity for studying changes in practice.

Selection of raw materials for making high-quality basic open-hearth steel was declared to be of the utmost importance. Raw materials of uniform analysis and of high quality are required. Perhaps the most important is the basic pig iron, which should contain 1 to 1.30 per cent silicon and at least 2 per cent manganese; phosphorus under 0.20 per cent and sulphur under 0.05 per cent are desirable. High manganese is desirable for several reasons, primarily to give a high residual manganese in the bath at melting, with a corresponding saving in manganese requirements in the final additions.

Why High Silicon Is Desired

High-silicon pig iron is desirable because it causes a heat to melt higher in carbon than when low-silicon pig is used. This results in a considerable saving, in pig iron. High silicon also increases the temperature of the bath. Low-silicon iron tends to give heavy, viscous slags, which require additions of large quantities of fluorspar to thin them. The analysis of basic pig iron should be constant. A uniform analysis insures uniformity in open-hearth operations and prevents the use of excessive amounts of iron ore on heats that melt too high. It also assures freedom from heats that melt too low and require the use of no iron ore.

Heavy melting scrap for basic furnaces should be free from small sections with high oxidation loss, should contain no alloy steel and should not contain much badly rusted scrap. Low-magnesia limestone is desirable.

Selection of the proper type of furnace is important,

also. High tonnage and quality rarely are found in combination in forging steel. Of all factors exerting an influence on the kind of ingot produced, perhaps the most important is the ingot mold. For each kind of steel there is a design of mold most suited to its purpose. Cracks in ingots causing rejections are due to the mold design. Molds should not have a too heavy wall section. The writer had found that the interior of molds, instead of growing larger, as is generally supposed, actually grows smaller.

Effect of Mold and Mold Wash

Ingot molds made from cupola iron have more accurate inside dimensions than those made from direct metal, but the latter have a longer life. The form of mold used in the author's plant has a heavy band around the top to prevent cracks in the wall. Another change in design is the gradual taper of the flutes to a perfect circle at the open end of the mold. This has reduced cracks in the ingot and increased the mold life.

A test was made on 200 heats to determine the effect of mold wash on the ingot and mold. The molds filled from one ladle were sprayed with a tar wash and no wash was used for the second ladle from the same heat. The percentage of rejections was almost identical, with the exception of cracked ingots. Those from cracks from the ladle without wash were 3.29 per cent, compared with 1.13 per cent from washed molds. This test proved that an ingot wash prevents cracks by lubricating the mold wall. A graphite mixture wash is now used, being atomized and sprayed from a high-pressure gun. High manganese, about 1.5 per cent, and low phosphorus and sulphur are desirable qualities in ingot molds, high manganese particularly being helpful to long mold life.

The charge for an 80-ton basic open-hearth furnace making forging steel containing 0.75 to 0.80 per cent carbon should be such that, at melting, the residual carbon will be sufficiently high to allow for moderate addition of iron ore, and to allow for about two hours between this ore addition and the addition of final deoxidizers. The author included a table showing the charge of raw material for a typical heat of forging steel, and the steel and slag analysis.

Working the Heat and Making the Slag Right

Shortly after the first melting test about 3000 lb. of ore is added to reduce the carbon. Then fluorspar is added to thin the slag to the desired viscosity. In an average heat of 0.75 to 0.80 per cent carbon the

carbon is allowed to drop to about 0.78 per cent. Then in a normal heat 1500 lb. of spiegeleisen is added to kill all action on the bath. At the same time the gas and air are cut down, which thickens the slag. The addition of 1500 lb. of burnt lime is often desirable at this time. This gives an added viscosity to the slag and enables the melter to finish the re-boil with thick, creamy slag. After the re-boil the final addition of ferromanganese is made and 10 min. later the heat is ready to tap. The final silicon addition is made in the ladle.

The author found that spiegeleisen gives better results than any other deoxidizer. The slags are better and there is considerable saving in manganese. Results of 100 heats taken recently, plotted on a chart, showed the upward trend of dissolved iron oxide in the steel as the bath temperature decreases, and the effect of temperature on the residual manganese in the bath.

It was found that heats which melt at about 1.30 per cent carbon give the lowest percentage of rejections. This quantity of carbon allows the addition of a moderate amount of ore. Heats melting too low and without ore addition, and those melting too high, necessitating large amounts of ore to reduce the carbon, produce an abnormal percentage of rejections.

Slight Delay in Ladle Helpful

After the steel is tapped it should be held in the ladle 10 or 15 min. This interval between tapping and pouring allows the inclusions, which have been fluxed by the final deoxidizer, to rise to the surface before teeming the steel. While alloy contamination is becoming a vital subject, proper selection of raw materials, particularly scrap, should give the finished product a total of not over 0.10 per cent in all alloys, which should not prove troublesome.

Forging steel as good as that produced by the acid process can be made by the basic process, said the speaker, in conclusion. He declared that basic open-hearth forging steel will show a minimum of segregation, excellent ingot surface, a minimum of pipe and a yield of 90 per cent or better.

Bottom Pouring Not a Panacea

Leo F. Reinartz, works manager, American Rolling Mill Co., Middletown, Ohio, in a written discussion, said that as the science of steel making advances the necessity of reducing defects and inclusions in open-hearth ingots is of utmost importance. Manufacturers of forging steel have worked out many refinements in



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THAT basic open-hearth steel can be made which will be as good for forging as acid steel is the point made in the first paper abstracted in this article. How the trick is turned is explained, from choice of materials to working of the heat. A second paper takes up the making of steel for oil well casings and shows what precautions are necessary to obtain satisfactory quality.

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operation to meet the demands for clean steel. Bottom pouring does not insure against dirty steel, but it helps to produce better surface on the ingot. Pouring hazards necessitate the greatest care in refining and tapping the steel. The method of slicing ingots described by Mr. Reagan is used in other quality plants, and provides the best internal inspection possible.

Mr. Reinartz stressed the desirability of high-grade raw materials. Pig iron containing 1 to 1.30 per cent silicon, he said, retards over-oxidation during the melting period and provides sufficient temperature at the finish of the heat. Pig iron containing 2 per cent manganese improves the quality of the steel. Such pig iron increases the fluidity of the slag and helps remove silicates and non-metallic impurities.

Limestone Excess to Be Avoided

Low sulphur and low phosphorus content in a charge means that the operation will not be complicated by melting excess limestone. In his company's practice high-magnesia limestone is avoided, because of the viscous slag it forms. He believes good-quality forging steel can be made in fast furnaces if the operation is properly controlled from an atmospheric and combustion standpoint. The theory that molds grow smaller in the interior does not check with his experience on large molds.

Mr. Reinartz said that statements have been made that tar wash in molds causes bad corner cracks in high-carbon ingots. However, this defect was not pronounced in Mr. Reagan's test. The writer's experience was that tar coating reduces the effect of splash when teeming top poured ingots. He said that the mold life reported was exceptional, and wondered whether the molds were made from direct metal or cast from the cupola. Mr. Reagan later stated that they were mostly made of cupola metal.

Special Attention to Ladle Design

Oval ladles have proved desirable in some plants, according to Mr. Reinartz, as they give a better life than circular ladles. He said the use of powdered lime to test out a stopper is preferred to the standard practice of using sand, especially when making rimming steel. He declared that patent deoxidizers and scavengers are no panacea for sloppy melting practice. For this reason, killed high-carbon steel must not be worked too hot at the finish of the refining period. The slag must be held as basic as possible, but fluid enough to allow gases to escape.

The steel maker must pay close attention to pit practice, to be sure of good results. In his company's practice 100-ton heats are tapped with sufficient slag on top of the metal in the ladle so that there is little

drop in the temperature between the start and finish of teeming. The yield of 90 per cent ingots from the charge is better than usually obtained, he said.

Ingots and Billets Are Different Things

R. S. Simmons, Pittsburgh Steel Co., stated that steel makers know the difficulty of making forging-quality billets, and can appreciate the difficulty in making ingots to be exposed to forging conditions or surface expansion without the benefit of previous hot work. Refinements of open-hearth practice, he said, are not so important in manufacturing forging-quality billets as in manufacturing forging-quality ingots. The charge and heat may be the same in both cases, but the open-hearth practice thereafter usually applied in making forging-quality billets would in many cases be fatal in making forging-quality ingots.

For instance, the temperature of the steel at tapping is confined to narrower limits. Too high temperature may mean cracks which would make ingots unfit for use, but would mean only more chipping in making billets. Too low temperature means surface blowholes, which might weld up in re-heating and re-rolling billets, but would not be eliminated when the ingots are to be forged. Again, flaws can be chipped from billets. But this is dangerous in the case of ingots, owing to the fact that minute blowholes are often opened by chipping, and these oxidize deeply when the ingots are reheated.

How Fast Ingots Should Be Poured

Speed of pouring is more important in ingots. Ingots to be exposed immediately to stresses at right angles to the cross-section must be bottom cast. Speed of pouring must be regulated, and bad conditions from variation in the temperature may be mitigated to some extent by regulating the amount of steel leaving the ladle each minute.

Henry D. Hibbard, consulting metallurgist, Plainfield, N. J., in a written discussion said that Mr. Reagan's paper is notable in that it establishes that basic high-carbon steel may be made at least equal in quality to acid steel. There may be some practical upper limit to the manganese in the crude iron. Some Swedish iron has or formerly had 3 to 4 per cent of manganese. The question arises as to the solvent effect of the manganese on the gases and the effect of retained gases on the quality of steel.

There is also a practicable upper limit to the silicon content in the iron, because a too acid slag will retard the elimination of phosphorus from the metal and will corrode the hearth beneath. With low-silicon mixer metal the bottom should need slight repair after a heat.

Alloy Steels for Oil Well Casing

A SERIES of interesting tests of alloy steels for oil well casing, made with a view to developing a steel of greater tensile strength to meet the constantly increasing requirements of the oil well industry were described in Mr. Bremmer's paper. He pointed out that steel of greater strength for deep well casing is demanded, because of the constantly in-

creasing depth of oil wells. Stronger steel is required because of the increase in the collapsing stresses at the bottom of the well, and in the tensile stresses at the top joint, due to the weight of the casing string. Toughness is an essential factor, also.

High-carbon seamless steel casing satisfied require-

(Continued on page 1200)

General Motors Experience with Tungsten-Carbide Cutting Tools

THE future development of tungsten carbide as a cutting tool was a subject of outstanding interest at the meeting of the Society of Automotive Engineers at the Book-Cadillac Hotel, Detroit, Oct. 7 and 8. W. H. McCoy, General Motors Corporation, outlined in a paper the experience of the various General Motors Divisions with this comparatively new material. This was followed by a lively discussion in which both users and producers participated.

Mr. McCoy said that there is no reason why tungsten carbide will not replace high-speed steel as a cutting tool in the same proportion that high-speed steel replaced carbon steel. He predicted that in the future there will be many different grades of cemented tungsten carbide, each grade being developed to suit a particular job, in preference to the present practice of finding the job to suit the tungsten carbide.

Describing the manner in which tungsten carbide was introduced to General Motors, Mr. McCoy said that in December, 1928, a tungsten-carbide tool was put in a division which had been experiencing difficulty in turning out a ferrule, which was a die casting having a hard chilled surface. The adoption of tungsten carbide material increased production from 6 pieces per grind to as high as 15,000 pieces and speed was stepped up 750 to 1400 r.p.m., the latter being the maximum speed attained on this machine.

Tool Shanks Need Preliminary Treatment

Although savings made in certain instances with tungsten carbide have been impressive, Mr. McCoy pointed out that similar economies are not possible on all classes of work, because certain shortcomings of the material make it necessary to confine its use to specific conditions. He said that General Motors had had little success on twist drills; also on some automatic screw machines the tools have failed because of chipping resulting from shock or intermittent cutting.

As cemented tungsten carbide has a high heat conductivity, which is greater than that of the shank

AN increased size of tip is advocated to care for heat developed and to prevent temperature rising high enough to bring about alloying with metal cut

Machining strains in tool shank should be removed before applying the tungsten carbide.

Many different grades of cemented tungsten carbide are predicted, each to suit a particular job.

material, two things are likely to happen when it is cutting a material which generates a great amount of heat:

First, the shank gets hot and expands away from the tip, breaking the bond; and second, there is a tendency to alloy between the chip and the excessively hot cemented tungsten carbide. This latter effect is particularly noticeable when cutting soft steel, but is not so objectionable when cutting steel in the Brinell range of 220 to 260.

When a tungsten-carbide tool is cutting soft steel a small fin appears on the cutting edge. This breaks off and takes with it a small portion of the carbide tip. This action is believed to be caused by

the generated heat being sufficient to raise the temperature of the extreme cutting edge to the point where actual alloying takes place between the chip and the carbide cutting edge. The alloy produced is brittle and breaks off, thus causing early failure.

These ill effects can be overcome with present alloys by increasing the size of the tip to such an extent that the heat will be conducted away rapidly so that alloying temperatures are not attained under ordinary working conditions. It also is advisable, said Mr. McCoy, to remove the machining strains in the tool shanks before mounting the tungsten carbide tips. This should be done after the machining of the recess is completed by packing the shank in a charcoal pot and heating it to approximately 1750 or 1800 deg. Fahr., allowing it to cool slowly. This procedure seems to eliminate the difficulty of tips cracking after the bond, these cracks not appearing until the tips are finish ground.

Calls for Numerous Grades of Tungsten-Carbide Tools

"It is our belief," said Mr. McCoy, "that a large number of grades will be developed for the individual application of this material as a cutting tool, much in the same way as high-speed and alloy steel of various compositions have been developed for individual applications.

"We all know that different alloy steels are used for different purposes. We use a medium tungsten,

high-speed steel on hot extrusion dies, whereas high tungsten-cobalt, high-speed steel is, at the present time, used for many machining operations. Similarly, it has been found that high-carbon, high-chromium steels (particularly those containing small quantities of vanadium and molybdenum) are very desirable where extreme resistance to abrasion, such as cutting and forming, is required. This steel is not particularly adapted for use when tools and dies made from it are subject to severe transverse stresses. In other words, it has been found that there is no one steel which will satisfactorily meet all applications. It has recently been demonstrated that one single type of tungsten carbide has as little chance of meeting all applications as one steel can be produced to meet all circumstances."

Tungsten carbide tools fail in the above cases because their low transverse strength is responsible for the breaking down of the cutting edge. Because of this fact, the development of cemented tungsten carbide alloy is along two distinct lines.

1. Discovery of new physical properties to meet certain specific applications by the use of binders other than cobalt.
2. Discovery of cemented tungsten carbide possessing diverse physical properties by means of the regulation of the size of the carbide particles which are to be bound with the alloy binders.

Mr. McCoy stated that alloying cobalt by introducing small quantities of such elements as copper, nickel and tantalum exerts a profound effect upon the physical properties of cemented tungsten carbide containing them. He said that the result of such alloying, which is now in an experimental stage, can be understood when it is realized that cemented tungsten carbide consists of 87 to 97 per cent tungsten carbide bound by an alloy of cobalt, the strength of the material being determined by the character of the alloy binder. It is therefore reasonable to expect, he concluded, that small additions of metallic elements will have a greater effect on the physical properties of tungsten carbide than they would have on those of alloy steels.

A second series of alloy will make its appearance

with the difference in properties depending upon the grain size, predicted Mr. McCoy. The size of the carbide particles to be cemented by the metallic binder is of utmost importance where fine cutting edges are required. In the early tungsten carbide the grain size varied and attempts were made to produce finer grains. Recent efforts have been exerted to control the size of these fine particles and experiments have been conducted which indicate that control of particle size will have a great effect on the hardness and strength of the finished product. One manufacturer has produced experimentally, cemented tungsten carbide in which all of the cemented particles are approximately the same size. Tests of this material indicate that it possesses strength equal to that of fully hardened high-speed steel. The principle involved in this regulation seems to show that when particles of carbide are sized so that there is a minimum amount of cement between the grains, greater strength results.

In a written comment on the present status of tungsten carbide tools read at the meeting by Mr. McCoy, Roger D. Prosser, Thomas Prosser & Son, New York, said that the best results with tungsten carbide are obtained through the use of high speeds with the same or lighter feeds than are customarily employed with high-speed steel tools. He emphasized that one cannot yet expect to get the advantages of hardness and wear resistance of cemented tungsten carbide and still retain the toughness of high-speed steel.

Mr. Prosser declared that "the high heat conductivity of cemented tungsten carbide is one of its advantages, and the use of a tip large enough to conduct the heat rapidly away from the cutting edge is one of the first principles of successful application. Many of the early failures were due to the application of thin tips by tool makers inexperienced in the proper use of tungsten carbide." In addition to using a larger tip to overcome the alloying or welding on of a fin, Mr. Prosser recommended light cutting oil and the use of proper tool angles for the material being machined. He declared the clearance beneath the cutting edge should be kept as small as possible (usu-

(Continued on page 1201)

EXPERIENCE OF GENERAL MOTORS CORPN. WITH TUNGSTEN-CARBIDE TOOLS

Machine	Material	Oper.	Surface Ft. per Min.	Depth of Cut	Pcs. per Grind Tung.-Carb.	Pcs. per Grind Tool Steel	Savings per Month
Milling	Aluminum	Fin. mill	938	0.015	1,013	34	\$1,450.00
Lathe	Cast iron	Fin. face	196	0.032	15,000	1,500	200.00
Lathe	No. 32 bronze	Groove	294	....	4,000	20	576.00
Drill press	Babbitt	Rough bore	...	0.093	40,000	400	350.00
New Britain	Cast iron	Drill	45	....	16,400	206	140.00
W. & S.	No. 32 bronze	Bore	157	....	1,064	10	300.00
Lathe	Alloy cast iron	Turn O. D.	98	1/8"	89	5	30.96*
Bor. mill	Cast iron	Bore	98	1/8"	89	7	31.96*

*Saving per tool.

Machine	Material	Operation	Prod. per Day	Cost per 100 Pcs. (H. S. Steel)	Cost per 100 Pcs. (Tung.-Carb.)	Savings per Month
Lathe	Cast iron	Face flange	2,400	\$5.83	\$3.14	\$1,166.82
Lathe	Cast iron	Face, turn and chamfer	200	15.28	3.36	452.00
Lathe	Cast iron	Turn, face and chamfer	500	24.69	8.37	1,589.60
Lathe	Cast iron	Face, turn and face hub	....	8.35	6.50†	.....

†Tool has never been sharpened and is still running.

Microcharacter Hardness Tester

Avoids Core Effect

MOVING a highly polished surface to be tested under the hard cutting point of a jewel, subjected to a definite load, giving it a very slow movement and then measuring the width of the cut produced, furnishes a definite measurement of the hardness of the surface scratched. This is the basis of an instrument described in a paper read by C. H. Bierbaum of the Lumen Bearing Co., Buffalo, before the American Society for Steel Treating, at Chicago.

In the first experiments a sapphire was used. It was found, however, that a slight wear on the point resulted in a short life of the jewel, especially when working on hard metals. Diamond points with the required degree of accuracy were a long time in development, before they could be ground with any assurance.

Now a jewel is available in small quantities in which the angles are all 90 deg. exactly, and the points are so sharp that they still appear sharp under the microscope at 2000 magnification. This jewel is so mounted in the instrument as to give an angle of incision of about 35 deg., resulting in a cut of 101 deg. subtended angle.

Lubrication of the surface under test adds to the smoothness of the cut. And it has been found by experiment that the superfine watch oils give best lubricating results.

Crystals in Metal Not Disturbed

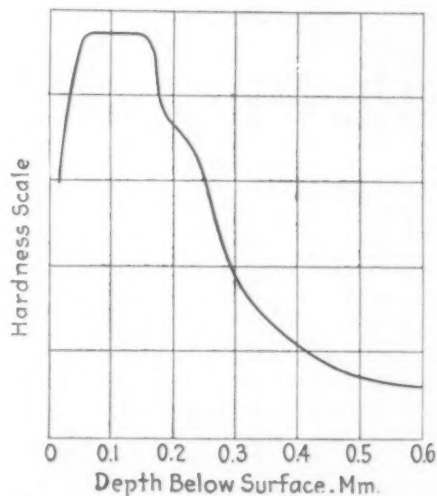
As the vertical pressure exerted upon the jewel is kept always considerably greater than the horizontal pull, no crystals of the metal being tested are removed from their position. The result is a clean-cut line which may, however, have a built-up rim on either side, due to the flow of the material.

It is essential that measurements be made always on the same basis. This may be on the outside of the built-up rim just mentioned, or it may be on the inside, but it should be established at once just which is being used and that one should become standard.

For the harder metals, exhibiting the narrower cuts, it is necessary to be able to measure to a fineness represented by one micron. Such close measurements naturally are not so essential for the softer metals.

This method is of particular utility in measuring the surface hardness of a nitrided object, when it is necessary to avoid any possibility of having any core effect show up. The line drawn by the jewel across such a nitrided object will vary in width as the hardness varies, and thus give a direct measure of that variation in hardness.

It was brought out strongly by the speaker that this is an instrument intended purely for research work. In its present form it is not adaptable for daily use in production or commercial work. The general law operating with regard to its indications is that the width of the cut varies as the square of the load. For most purposes a weight of 3 grams



Curve of hardness penetration in a nitrided specimen as developed by a microcharacter tester shows maximum hardness a short distance in, instead of at the surface

upon the jewel is adequate. For very hard surfaces it may be necessary to go to 9 grams for best results.

This speaker reported that his tests with this instrument had shown something not heretofore observed in measurement of hardness of nitrided objects. That is, that the maximum hardness of the piece is not on the extreme outside surface, but is at a fraction of a millimeter below that surface. He has found that the maximum hardness in such a case has an appreciable thickness in the material, somewhat as shown by the horizontal line at the top of the diagram. Thence it tapers off in accordance with the usual set of observations.

Commenting on this point and on the use of this instrument in general, another speaker expressed the view that we are now on the eve of much greater accuracy of measurement of hardness.



An Incentive Plan That Does Not Include Bonus, Premium or Piece Rates

By F. L. PRENTISS

Cleveland Editor, The Iron Age

A WAGE incentive system that does not include bonus, premium or piece rates appears to have proved highly successful at the plant of the Cooper-Bessemer Corporation, Mount Vernon, Ohio, manufacturer of gas engines and air compressors. Workers are divided by an efficiency rating system into three classes and their pay, which in all cases is a day rate, depends on the classification to which their efficiency record assigns them.

A man's efficiency rating, which regulates his pay and is computed each month, is based on the time taken to do a certain operation as compared with the standard time set for the job, the amount of defective work he produces and the number of tools he breaks. Rating men with a perfect efficiency record at 100, deductions are made for failure to attain this mark in quality, quantity and carefulness, lack of the latter being shown by his broken tools. Examples of the method of computation are given below based on an estimated time of 200 hr. required for a certain operation.

1. Estimated time—200 hr.
Actual time taken—200 hr.
 $\frac{200}{200}$ —100 per cent efficient.
2. Estimated time—200 hr.
Actual time taken—225 hr.
 $\frac{200}{225}$ —88 $\frac{8}{9}$ per cent efficient.
3. Estimated time—200 hr.
Actual time taken—180 hr.
 $\frac{200}{180}$ —111 per cent efficient.

The man's efficiency, as indicated above, has been determined by the quantity of work he has produced in a given time compared with the standard time as shown on his time card. In order to maintain a standard quality of work and to impress on the employee the importance of quality, the total hours used in



▲ ▲ ▲
EACH worker is paid a day rate based on his efficiency rating.

The employee's rating is computed on the basis of the time taken to do a certain operation as compared with the standard time set for the job, the amount of defective work he produces and the number of tools he breaks.

Pay is increased each quarter for four quarters if an employee maintains or increases his efficiency rating.

No reductions in pay are made if a workman does not maintain his rating. Instead he is given notice and, if his work does not improve, he is discharged.

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THE daily, monthly and yearly efficiency of each operator is entered on charts on the wall and records on the table in the superintendent's office (Above)

In the estimating department actual time is checked against estimated time to compute the efficiency of the worker (Below)

▲ ▲ ▲

making defective work that is rejected or scrapped by the inspection department is deducted from his efficiency. Assuming that the operator is 100 per cent efficient as to quantity of work or does it in the established time, as is shown in example No. 1, but 20 hr. has been charged against him for defective work, as shown by the report of the inspection department, his efficiency would be

4. $100 \text{ per cent } \frac{20}{220} = \text{approximately } 90 \text{ per cent efficient.}$



Efforts are made to impress upon the careless employee who breaks tools the importance and cost of such tools, and consequently his carelessness is penalized in his efficiency rating. The tool cribs are equipped with McCaskey Industrial system of tool records, which aids the management in keeping an accurate record of each tool broken and its cost. If a man breaks a tool valued at \$24, this value is reduced to hours by dividing \$24 by \$2 and he is charged with 12 hr. The loss of this time would reduce the employee's efficiency as follows:

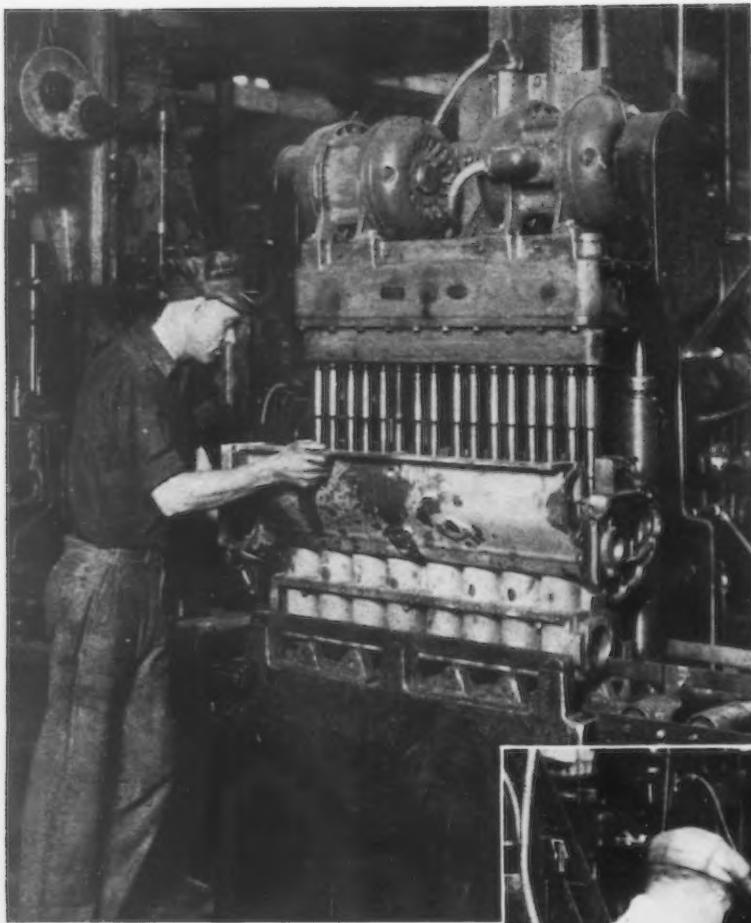
5. $90 \text{ per cent } \frac{12}{200} = 84 \text{ per cent efficient.}$

The employee in this case completed the job in the established time, but lost 10 per cent because of quality shown by defective work and also lost an additional 6 per cent because of carelessness, making his average efficiency 84 per cent.

How Employees Are Classified

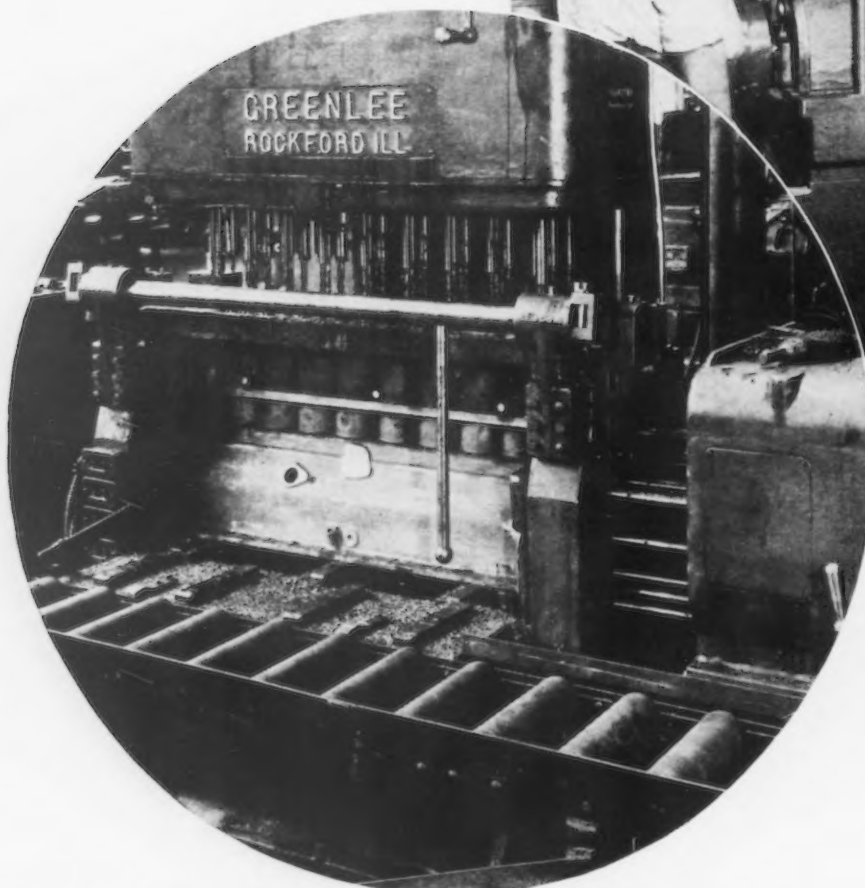
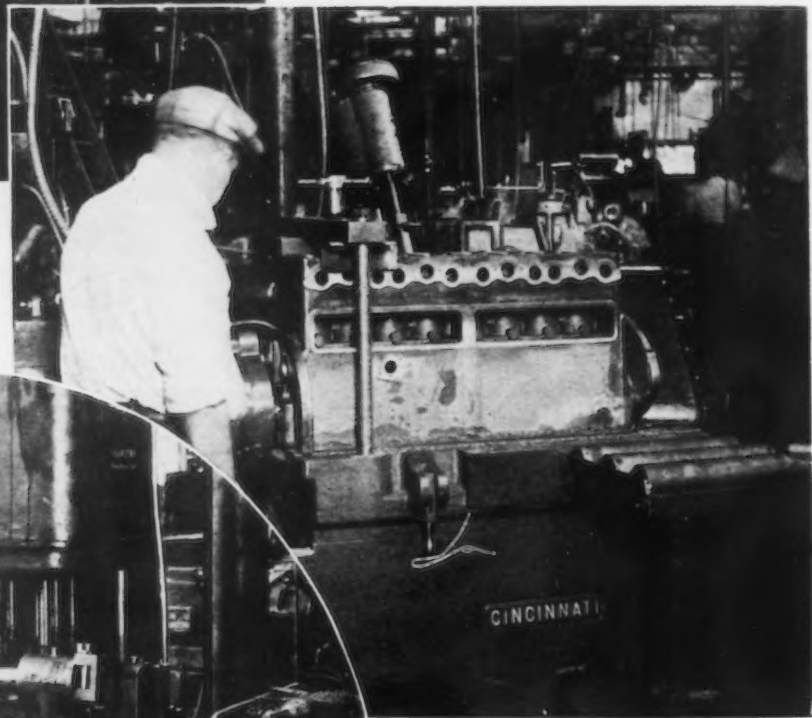
In the division of the employees into three classes based on their efficiency rating, men who are 80 to 100 per cent efficient are put in the A class, those 70 to 80 per cent efficient in the B class and those below 70 per cent in the C class. The pay of an employee is increased each quarter for four quarters or a total of 10c. an hour if he maintains or increases his efficiency

(Continued on page 1202)



MODERN TOOLS USED AT REO PLANT

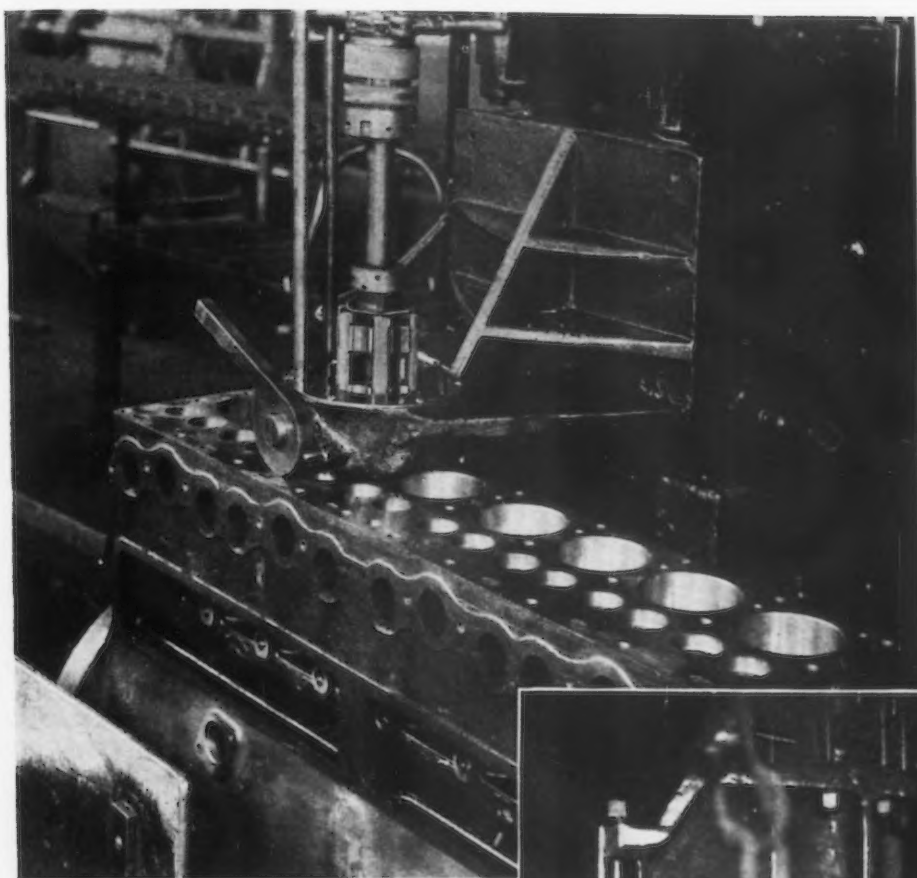
THE views on this and the opposite page form a continuation of the article in last week's issue outlining the cylinder block machining operations at the plant of the Reo Motor Car Co., Lansing, Mich. Figs. 12, 13, 14 and 15 referred to on pages 1072 and 1073 are here shown, as well as two additional views of equipment in the new cylinder block line.



FACING of valve stem guide bosses for the spring seat on special spot facing machine is shown at upper left (Fig. 12).

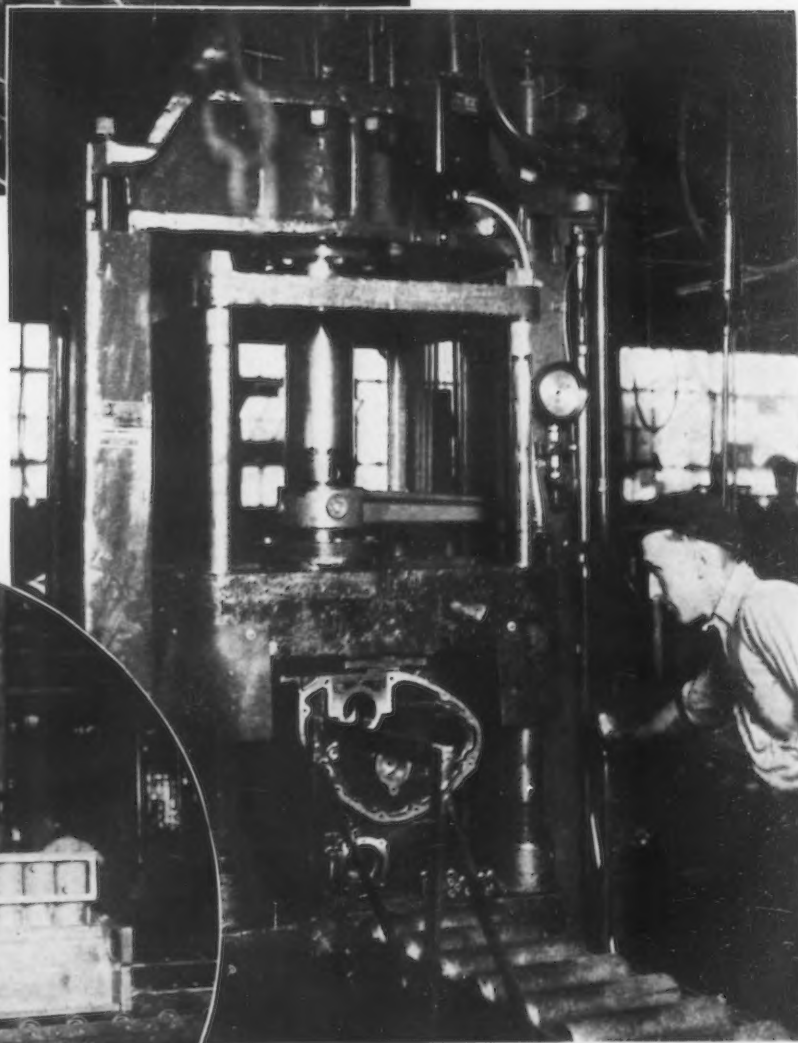
The special eccentric head miller shown above (Fig. 13) mills the rear crank bearing to length and spot faces for the inspection gage.

A number of drilling operations are performed on three-way drilling machines such as shown in the circle at the left

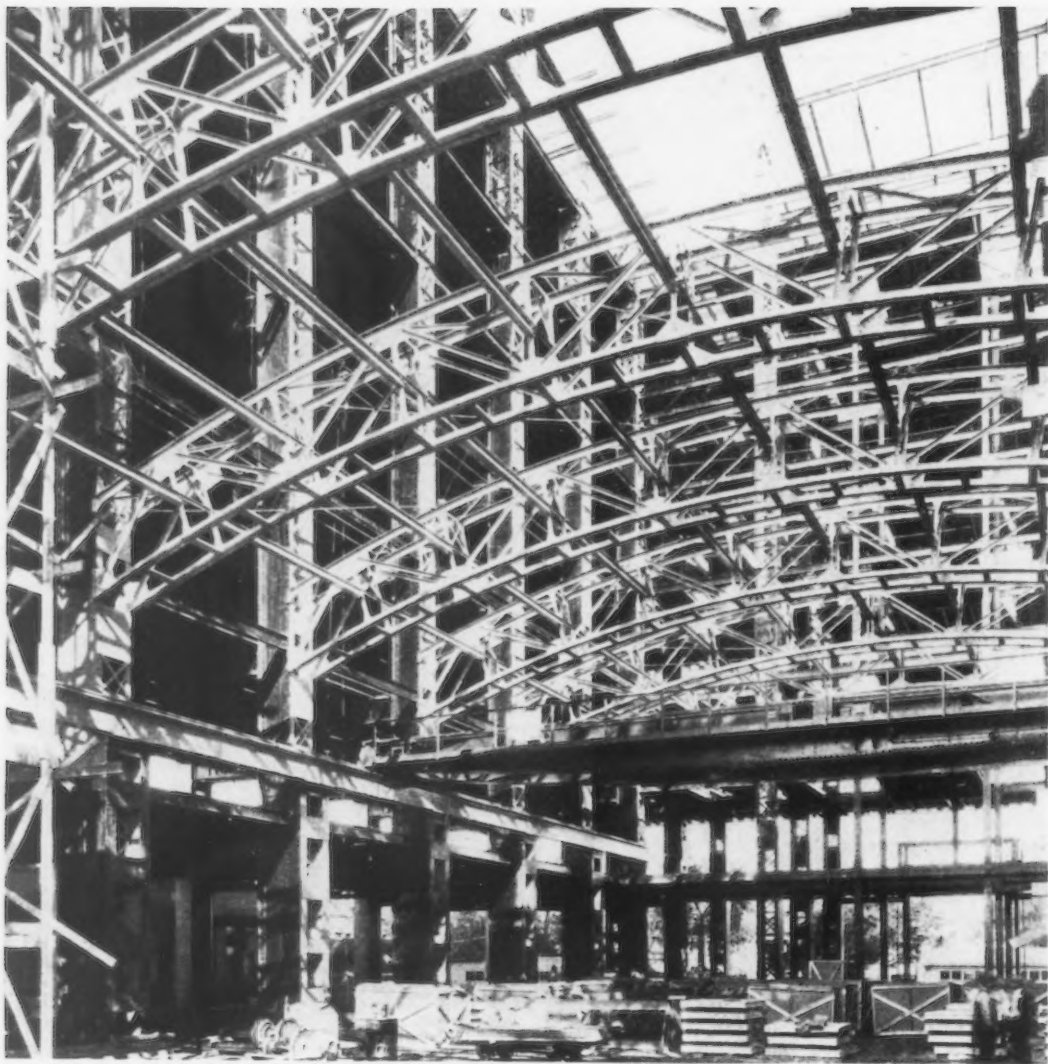


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THE cylinder honing machine (Fig. 14, at left) is equipped with a special fixture
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BOTH roller conveyors and chain hoists are used for transferring the cylinder blocks from one machine to another

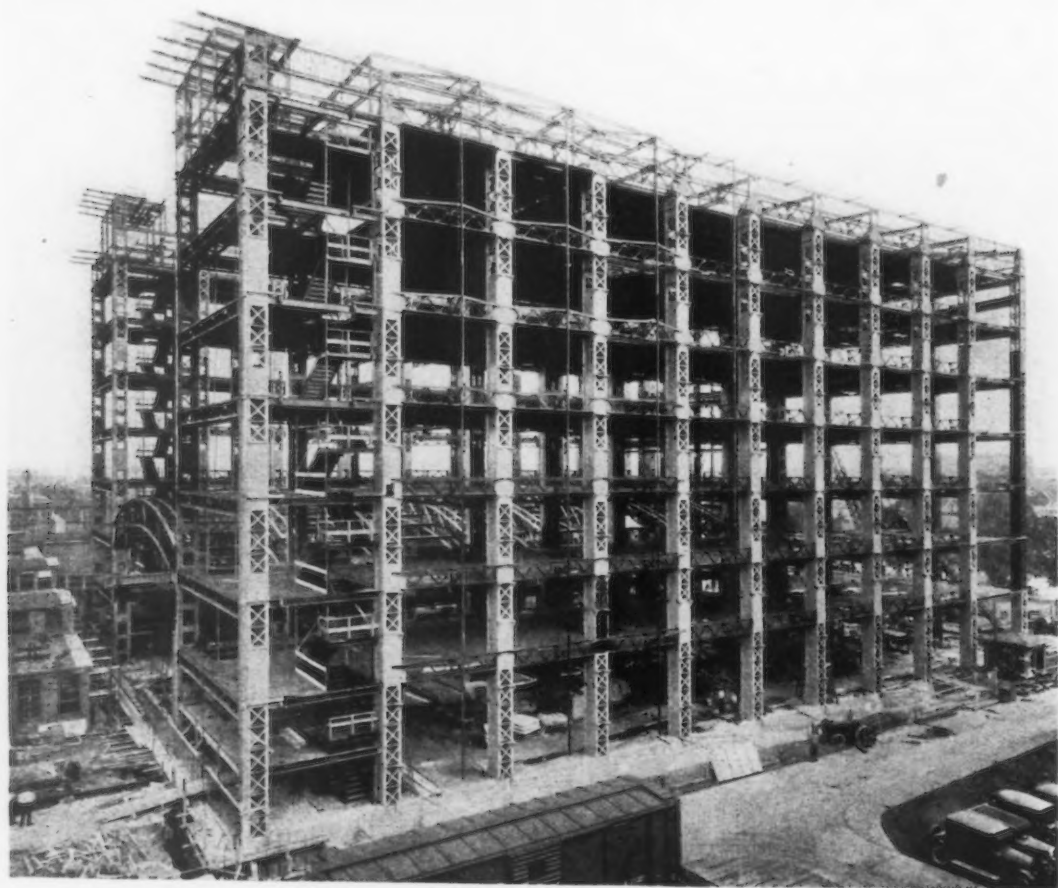


VALVE stem guides are assembled on a 35-ton Oilgear hydraulic press (Fig. 15)

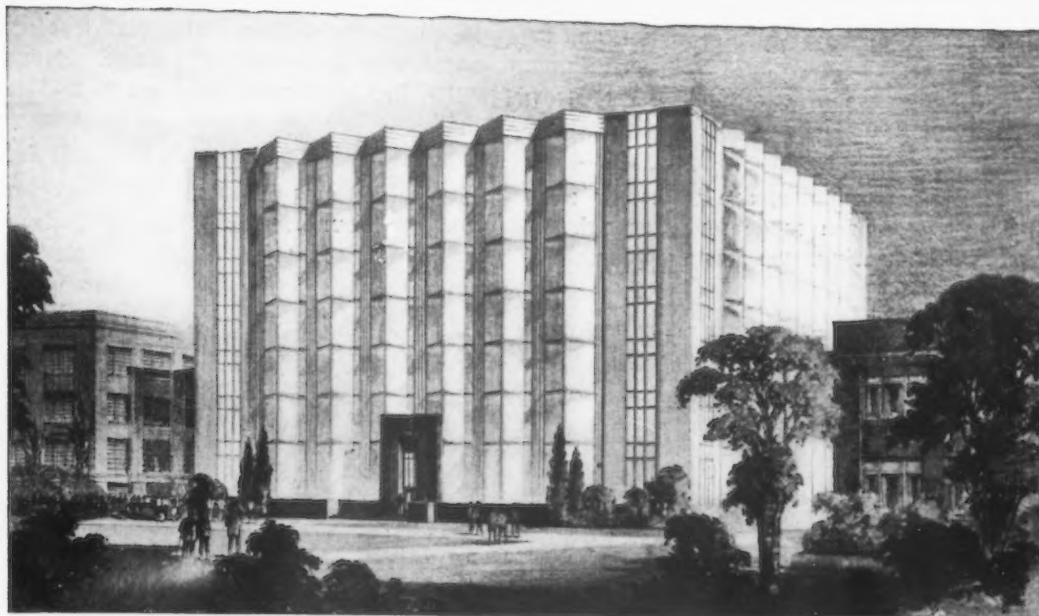


A. O. SMITH
Research
Building

▲ ▲ ▲
*C*RANEWAY
in court of
the U-shaped
building with 20-
ton crane having
20-ft. lift. Span
is 80 ft. and
length of crane-
way, 160 ft.
▼ ▼ ▼



▲ ▲ ▲
*S*TRUCTURE
of building,
with hollow col-
umns and girders
and battledock
floors. Craneway
is in center, un-
der the arches
▼ ▼ ▼



Exterior of This Research Building Will Be Finished Almost Wholly of Glass and Aluminum

Research Building Designed for Broad Use of Steel and Aluminum

HOLLOW-TYPE columns and girders, battle-deck steel floors, extensive use of metal on the exterior, and vertically continuous windows, V-shaped in plan, are some of the novel features of the new research and engineering building now being constructed for the A. O. Smith Corp., Mil-

waukee. The use of metal is to be carried into the interior ornamentation of the building, also.

Columns are built of 4-in. x 6-in. angles placed to form a square approximately 3 ft. on the side. On the inside corner of the column—that is, with respect to the building—two additional 4-in. x 6-in. angles



Welding the battledeck floors to the beams through spaced holes. This view shows also the column and ceiling construction

are applied, to reduce any over-turning action and to add to the stiffness. The two sides of each column flanking the windows are of continuous steel cover plate; the remaining two sides are braced with batten plates, diagonal bracing and lattice strips.

Girders, as well as columns, are of hollow construction. They have been made large enough to serve as ducts for heating, ventilating, plumbing, lighting and telephone systems, as well as steam power pipe, high-tension electric lines for welding, oxygen lines and compressed air lines. They are large enough to provide space to permit free passage of workmen when inspections or repairs are required.

The battledeck type of floor construction was adopted because the dead load transmitted to the columns is 25 per cent less than in any of the more common types of floor construction. Therefore the column sizes and footing areas could be reduced, making for a decrease in construction cost because of decreased dead loads.

Another factor, which is of especial interest to the metal industry, is that this type of construction points a way to a greatly increased use of metal in architecture in the future.

On the exterior the building will be almost entirely faced with aluminum and glass. The exteriors of vertical structural members are to be faced with fluted extruded aluminum. The windows are to be vertically continuous, V-shaped in plan, having the spandrels so constructed as to be reduced to a line of metal in the elevation. The windows extend from the first floor sill to the attic sill, a distance of approximately 100 ft. They are capped with a continuous aluminum coping or parapet which follows the zig-zag plan taken by the glass. These V-shaped windows occur in batteries of six in the front elevation and eight in each of the two side elevations. Aluminum will be used for metal trim in the lobby.

The research and engineering building has been designed primarily as a workshop for the 1000 engineers who make up the A. O. Smith Corp'n.'s engineering force. It has been planned to provide them with every convenience and comfort that will enable

them to carry on their industrial developments in research work to the best advantage. Every department will be furnished with the most up-to-date equipment.

Preheated Blast for Foundry Cupolas

A STUDY of preheating the blast for cupolas in iron foundries is given in Bulletin 32 of the Michigan Engineering Experiment Station, East Lansing. It was prepared by Frederick G. Seifing and Marion F. Surls of the department of mechanical engineering. Its 12 pages, illustrated, show the methods used in making the study and the results.

Conclusions are that a saving of 20 per cent or more in fuel cost follows preheating of the blast. This operation is economically feasible because the temperature of the stack gases above the charge is high enough to warm the blast appreciably and, furthermore, these gases contain considerable CO, which burns to CO₂ above the charge, giving heat which may be utilized for preheating the blast.

In the cupola where tests were carried out the gas analysis in the stack showed about 11 per cent CO which is said to be 3 per cent

under average standard practice. The heat available from burning this CO to CO₂ amounted to 33 per cent of the heat in the coke—the latter having 86 per cent C. With higher percentages of CO in the stack gases more heat would be available for preheating the blast. The heat absorbed by the blast during preheating is utilized in the cupola between the tuyeres and the melting zone.

Hot blast increases the speed of melting. It also raises the temperature of the melted iron when the ratio of iron to coke is the same as is customary with cold blast. As an alternative, the hot blast may permit the cupola to melt iron at the ordinary melting speeds and temperatures, with a reduction of one-fifth or more in fuel consumption.

During the ore season of 1929 the Great Northern Railroad hauled ore from the mines to the docks in trains which averaged 168.85 cars. The average load of each car was 54.3 gross tons. The 107 miles average haul averaged 6 hr. 37 min., says *Railway Age*.



LOOKING up one of the hollow columns, designed to carry all service wires and pipes, and large enough for their inspection and repair when necessary

Machine Shop Problems in the Automobile Field

NEW developments in machining aluminum and its alloys, tungsten carbide as a machining material, conveyors in the automotive industry and wear allowances and tolerances on gages were the subjects treated at the two technical sessions in connection with the ninth national production meeting of the Society of Automotive Engineers, Inc., at the Book-Cadillac Hotel, Detroit, Oct. 7 and 8. An economics session also was a feature of the program. The large attendance and the enthusiasm of the members attested to the success of the production dinner on Wednesday, Oct. 8, which brought the meeting to a close. On this occasion the Detroit section was the host.

That the society might well set up a group to study the economics of distribution and production, bringing into the group the higher executives in the automotive industry, was the proposal of John Younger, chairman of the production activity committee. Mr. Younger intimated at the production dinner that he intends to put forth this suggestion formally in the hope that it will be acted upon favorably.

The efficiency reached by the automobile industry in mass production at low costs was ascribed to 11 major factors by C. E. Wilson, vice-president, General Motors Corp., New York, who was the chief speaker at the production dinner. These are the development of high-speed tool steel, manufacture by machine tool builders of single purpose and scientifically designed tools, standardized cost accounting, progressive assembly, development of wage payment methods and time study operations, use of conveyors and other material handling facilities, scientific expansion of production and inventory control, careful design of jigs, fixtures and other equipment aside from machine tools and materials handling machinery, budget control of expenses, selection and training of employees, and stand-

ardization of parts, which has been broadened to include standardization of operations.

Looking ahead, Mr. Wilson believes that industrial chemistry is going to play a more important role in industry and that a more thorough study of the economics of production is needed. He emphasized that overhead expense is largely controlled by the engineering department and that much depends on the approach of the superintendent, master mechanic and other plant officials to the problem of tooling up a factory for profitable manufacture of a product.

Mr. Wilson prophesied that electric welding will come into constantly greater use, stating that General Motors now is getting better and

stronger parts by taking light stampings and welding them together than by machining heavy castings. He laid the blame for much of the current depression at the door of distribution, the economics of which has not kept pace with that of production.

J. A. Bohannon, president Peerless Motor Car Co., Cleveland, and Gordon Lefebure, vice-president Oakland Motor Car Co., Pontiac, Mich., were chairmen of the first and second technical sessions respectively. P. J. Kent, chairman of the Detroit section, was toastmaster at the production dinner. Convention delegates devoted an afternoon to inspection of the Plymouth plant of the Chrysler Motor Corporation and the forge plant of the Chevrolet Motor Co.

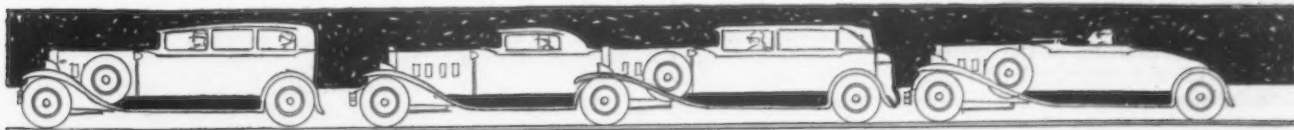
Eight Factors to Be Considered in Machining Aluminum

FACTORS which must be considered in addition to tool shape in order to get best results from machining aluminum, declared R. L. Templin, Aluminum Co. of America, New Kensington, Pa., at the technical session Tuesday morning, Oct. 7, are the type of tool, tool material, rate of cutting or amount of stock removed per unit of time, coolant character of work, machine tool used, the operator's personal equation and availability of commercial tools and machines of the desired kind. The type of tool frequently imposes limitations materially decreasing the production rate, because shape requirements cannot be met. Again, the cutting edges of the tool may be of the proper shape, but the design of the tool may not have ample provision for taking care of the continuous, but slightly curled cuttings characteristic of many aluminum alloys. Such difficulties sometimes occur when using certain types of automatic die heads.

The choice of tool material, according to Mr. Templin, should be governed to some extent by the type of

tool, the machine with which the work is to be done and the character of the work. High-speed steel tools, except those containing appreciable amounts of silicon, give much better results than high-carbon steel tools. These high silicon alloys, however, can readily be machined on a production basis using cemented, tungsten carbide tools. The rate of cutting is a function of speed, feed and depth of cut. If the tool is of the desired shape, high speeds frequently can be employed in machining aluminum, but because of the comparatively thin cutting edges of the tools, rather fine feeds with moderate depth of cut, or moderate feeds with small depth of cut, will generally give the best results.

The coolant not only serves to carry off the heat generated during the machining operation, but may and probably does act somewhat as a lubricant between the chip and tool as well as between the work and the tool. A mixture of lard oil and coal oil or kerosene, usually of equal parts, generally is the best coolant. How-



ever, for heavy cuts more lard oil is used and for light cuts at high speed more kerosene. Satisfactory results also are secured by solutions of soluble oil and water.

Until recently many machine tools were not designed to give the high cutting speeds recommended in machining aluminum, said Mr. Templin. The advent of cemented tungsten carbide tools, however, has diminished this difficulty. The machinist frequently is obliged to use commercial types of small tools primarily intended for brass or steel, when machining aluminum. In order to facilitate this process, Mr. Templin expressed the hope that small tool manufacturers will point out more clearly in their sales literature the types suitable for aluminum. If this were done, the increased demand might reasonably be expected to warrant such types being carried regularly in stock.

The helical type of milling cutters, reamers and end mills having considerable top rake on their cutting edges continue to give good results in

machining aluminum. This also is true of spirally fluted taps, but in such tools the cutting edges should be made thinner by grinding an increased amount of top rake on the cutting edges.

Much of the trouble in machining aluminum, declared Mr. Templin, comes from the fact that often the operator is trying out his own ideas instead of following instructions. He said that his company now is making forged pistons of silicon alloys for radial aircraft engines. They are machined with cemented tungsten carbide tools ground as nearly as possible to chips. One method of tapping aluminum is to use the spiral fluted type of tap, preferably of high-speed steel. The taps now on the market are deficient because they have no clearance on the back of the lance. Men educated to the proper tools for machining aluminum use them successfully in turning annealed high-carbon steel. The only drawback is that the operator has to contend with a long, wicked chip, according to Mr. Templin.

How Much Wear Should Gages Be Allowed?

DEFINITE wear tolerances should be set up for all gages in a factory, urged E. J. Bryant, Greenfield Tap & Die Corp., Greenfield, Mass., in a paper on "Wear Allowances and Tolerances on Gages." These should include master gages, inspection gages and production gages. A definite time should be established for inspecting each gage and a record made of the inspector's findings. In some factories each gage is numbered and on a card bearing the number is kept a complete record of gaging sizes.

Frequent disputes between inspection and production departments regarding the size of work are usually due to worn gages and to the fact that the gage in the hands of the production department is smaller than that used by the inspector. With proper reinspection of gages and allotment to the production department of the larger gage, or the one with the greater amount of wear, these disputes can be eliminated. This is true of all classes of gages, but particularly of thread gages where there are several elements entering into the wearing surface of the gages, such as angle error, worn sides and minor diameter.

Plug gages wear faster on the front end, said Mr. Bryant, so that allowance must be made in setting up the wear limits at which gages must be replaced. On an ordinary run of sizes, gages should be rejected that have worn 0.0002 in. undersize a quarter inch from the front end and 0.0001 in. undersize at the back end. There are several factors causing excessive wear of gages, such as small holes or tight work, resulting in the continued forcing of the gage. Dirty work, especially grinding grit and water in

the holes, even the size of the handle, has a decided effect on the life of the gage. The use of dogs or "jitneys" greatly increases the wear of gages.

Mr. Bryant stated that "a shiny surface does not necessarily mean a smooth, flat surface. As a matter of fact, more frequently bright, polished surfaces are not sufficiently flat to make good gaging surfaces. Only when this high polish is obtained by flat laps, as in mechanically lapping or the better grade of hand lapping, is a flat surface obtained, that is, a surface in which there are no deep cuts." In the case of gaging extremely hard work, it is found that a hard gage will stand up from 25 to 50 gagings, whereas a soft gage, carefully used, will gage several hundred pieces before becoming appreciably worn.

"The material being gaged has an important bearing on the life of the gage. Aluminum, brass and cast iron are all much harder on gages than soft steel. Some grades of aluminum cause the most excessive wear, particularly if there is any tendency to force the gage. Dry brass parts, and particularly those with a high percentage of copper can be gaged with less gage wear if a small amount of light lubricant is used on the gage."

If gage blocks are carefully cleaned, they can be used a long time without perceptible wear, but under ordinary conditions they should be inspected frequently, as they are soon worn undersize.

General practice indicates that crucible alloy steel with a high carbon content at the gaging surface makes the most economical and satisfactory gage, said Mr. Bryant. The

requirement that the gage surface be 100 per cent hard is most easily obtained through the use of alloy steel. Chromium plating has met with varying success, but the fact that no bond exists between the plate and the metal on which it is applied, making it liable to chip or peel off, has prevented its more general acceptance. Tungsten carbide gages, although high in first cost, are economical where there is constant production and excessive wear of gages, particularly where close tolerances are maintained.

Go gages should be made larger than the minimum size hole usually by the amount that represents the production tolerance for the gage, although in some instances a definite wear allowance is made in addition to the necessary production tolerance, stated Mr. Bryant. The wear on not-go gages is considerably less severe than on go gages. No allowances for wear other than the gage makers' tolerance are provided. It must be remembered that applying the gage production tolerance minus on not-go gages greatly reduces the working tolerance of the parts, particularly where these tolerances are close, that is, from 0.0005 to 0.002 in.

Parts rejected in the general run of inspection are entitled to reinspection with gages that give the full benefit of the maximum and minimum part size. In connection with checking rings with plugs, Mr. Bryant called attention to the belief that a plug will not enter a ring of the same size, stating that the fact is that metal is elastic and a plain plug and ring of the same size will go together quite readily. The plug may be slightly larger than the ring or the ring slightly smaller than the plug, but with the ordinary amount of lubricant on the gage it will require only the amount of pressure usually exerted by the operator in putting a plug into the hole to have them come together. They will come apart easily if not allowed to set too long.

Measurements are an important factor in checking gages for wear, declared Mr. Bryant. In general, soft gages do not permit of accurate measurement, principally because it is difficult to obtain a flat, smooth finish, and second, because of the soft nature of the material the measuring surfaces are apt to sink in to a certain extent. This is particularly true in measuring soft threads with wires. In measuring a gage for wear it is important that the checking tools check the point of wear in the gage. Worn gages should be rejected when they have reached the wear limit that has been set up. In the case of go gages, this should be basic size, although in some instances it is economical to permit an undersize condition.

Precautionary measures insuring clean parts before gaging would increase the life and lower the cost of gages, maintained W. H. Gourlie, gage division, Pratt & Whitney Mfg. Co., Hartford, Conn., in a written discussion of Mr. Bryant's paper. Even the highest degree of finish on the

hardest metals will wear quickly when grit, emery or chips are prevalent. Mr. Gourlie admitted that users differ as to the advisability of taking time to clean the part before gaging, believing that the time so occupied more than offsets the higher gage cost. Some companies even gage under power, but must expect greater gage wear and occasional breakage.

Mr. Gourlie observed that plain, cylindrical plug gages, fully machine lapped, will outlast ground gages by so much as to make comparison almost unbelievable. All production jobs should be checked with gages having the smooth finish that only lapping can give.

Cleanliness is an important factor in the use and wringing of precision gage blocks. A block which is burred or covered with a film of grease or

dirt will not wring to another block. Moreover, any burrs or sharp, gritty particles under pressure will scratch the gaging surface and two inaccurate blocks are the result. Careful use of blocks prolongs their life, carelessness shortens them. Cases on record range from 10 years down to one week.

Regular gage inspection periods should be established, the interval being based on experience with each type of gage. Application of tolerance on not-go plug gages on the plus side is an illustration of extending product limits. It may be acceptable in some applications, but is highly dangerous, particularly when the product is sold and reinspected by the customer. A single rejection might eat up the savings in gage costs over several years.

chines are employed in the performance of a given task.

Training of a tool engineer, said Mr. Jones, should be fundamentally that of a tool designer, since he must supervise the designing of all tools and equip all machines in the plant with the particular kind of tools adapted to the most efficient production of the parts being manufactured. His education also should deal primarily with the methods and equipment used for removing metal or machining the details and testing them for accuracy as to dimensions. Emphasis should be placed on the designing of special devices which must be fitted to standard production machinery to adapt it to the performance of specific operations. He also must have a thorough training in cost calculations, for he must constantly weigh the initial cost of a contemplated method or design.

The tool engineer should be educated by the cooperative method. He should have the characteristics of an executive, plus inventive ability, resourcefulness and mechanical ingenuity. Mr. Jones concluded that "if manufacturers and educators will cooperate and do as careful planning in developing a course of study and method of training tool engineers as the tool engineers themselves have done in perfecting highly efficient plans of production, we may confidently expect and demand that the tool engineers will do more in the next 30 years in the advancement of the methods of mass production than they have done in the last 30 years."

Features of Mechanical Handling Apparatus of the Future

A PAPER describing the principal types of conveyors used in the automobile industry, naming briefly the field of application for each type, was contributed by J. H. Hough, Mathews Conveyor Co., Ellwood City, Pa. He likewise recited the basic formulas in simple form for computing economies of materials handling equipment. To evaluate the formulas properly, he supplied approximate costs on a per foot basis for different types of conveyors. He said that the power-driven, overhead chain trolley is one of the most popular types of conveyors because of its flexibility of application. Drag chain and roller conveyors are the most commonly used types of general conveyors in automobile plants.

"While it has been customary in the past to charge factory burden or overhead to labor-saving devices," said Mr. Hough, "it has not been customary to credit labor saving devices for their portion of overhead saved, which generally is proportional to the difference in labor, since there is usually a definite relationship between labor and overhead."

Looking into the future, Mr. Hough anticipates the perfection of devices which will automatically receive almost any variety of boxes or cases onto conveyors and automatically deliver them to the desired destination. Special high-temperature material will be employed to give in-

creased life to conveyors operating under high temperatures. Rust-resisting metals will be more generally used for conveyors going in and out of water baths and mild acid solutions. Mr. Hough reminded his auditors that the conveyor engineer is somewhat handicapped in planning for the future because the equipment he designs is seldom built in quantities.

In the discussion of Mr. Hough's paper, J. E. McBride, Parker Wheel Co., attributed the extensive use of conveyors in automobile plants to the following considerations: (1) Saving of floor space. (2) Conveyors serving as a pacemaker for assembly operations. (3) Reduction in inventory. (4) Providing best means of transportation. (5) Taking control of production from workmen and putting it in hands of management, which then can set speed of output. (6) Making neat and orderly appearance of plant. (7) Human effort and strength saved by application of conveyors.

W. B. Casgrain, Mechanical Handling Systems, Inc., Detroit, said that gravity conveyors in production machine shops are giving way to power-driven conveyors of both overhead and floor types. D. A. Blair, Jervis B. Webb Co., Detroit, pointed out that a more expensive conveyor installation sometimes shows the greater percentage of saving due to the fact that it occupies less floor space.

Believes Day of Special Machine Is Waning

THE day of the special machine seems to be waning, because discoveries and style changes in a car make it an economic hazard, stated O. B. Jones, Detroit School of Applied Science, in a paper at the economic session dealing with "The Tool Engineers Place in Mass Production." To design a special machine at a cost of several thousand dollars to drill an oil hole at a certain angle in a crankshaft is not economical, unless the

year's production is so great that the machine will be worn out within a year, or unless the year's savings affected by the machine more than offset its cost.

Three factors entering into the work of the man who plans how a part is to be launched into production are men, methods and machines. The ideal combination of these factors is realized when the least number of men and the greatest number of ma-

\$17,500 in Prizes in Arc Welding Contest

The Lincoln Electric Co., Cleveland, has announced a new prize competition, with 41 prizes totaling \$17,500 for the best papers submitted on arc welded construction. This is the second contest of the kind sponsored by the Lincoln Electric Co. The purpose is to stimulate designers and engineers to think of the manufacture of their own products by the use of arc welding and to increase their knowledge of its application.

The jury of awards will be composed of the electrical engineering department of Ohio State University under the chairmanship of Prof. Erwin E. Dreese, head of the department, and others whom he may select.

The first prize is \$7,500; second, \$3,500; third, \$1,500; fourth, \$750; fifth, \$500; sixth, \$250, and the remaining 35 prizes will be \$100 each.

American Cast Iron Pipe Co., Birmingham, is celebrating its twenty-fifth anniversary. The company was founded by John J. Eagan of Atlanta, Ga., and since his death the management has been in the hands of trustees following the instructions of Mr. Eagan's will. During its 25 years the company has increased its annual production from 20,000 tons to 180,000 tons.

Industrial Engineers Urge Courageous Use of Credit and Increased Spending



OPTIMISM, courageous use of credit and increased spending were urged to remove unemployment, the "key log of the jam," by the board of directors of the Society of Industrial Engineers.

These recommendations were voiced by the board at an executive session held in connection with the seventeenth national convention of the society at the Mayflower Hotel, Oct. 15 to 17. The board declared that "enthusiastic pessimism" is disturbing business in the United States today. It was urged that workers be given work so that they may buy. Business executives were told that they must take courageous action now and "show backbone and spunk in getting their credit to work." Active selling, backed by intelligent production, backed by credit dollars, will turn the pendulum the other way, it was declared.

Flexibility Needed in Business

A point frequently made by the convention was emphasized when the board declared that education is a vital need in business, and that the executive in most cases is lacking in fundamental knowledge of the factors and influences which make the economic wheels go round. Speakers at the convention pointed to the necessity of industries engaging industrial engineers for the application of efficiency methods of production and distribution.

"Flexibility is needed in business," said a statement issued by the board. "It should be at all times ready for change and for readjustments of its front line sales and production operations. Properly prepared for any developments which may come from the swings of the pendulum, it can reduce to the minimum and finally to the fading out point the fearsome specter of depressions and dips swinging toward business in great circles.

Obsolete Equipment a Burden

"Obsolete equipment is one self-imposed burden which business is bearing today. Such equipment should be shown the door. New equipment should replace the old. Nineteenth century ideas of management, still occupying the post of command in many organizations, must surrender. Scientific planning and production and intelligent control of inventories are two basic needs in industry today.

"Business and industrial executives no longer can pass unemployment,

ACTIVE selling, backed by intelligent production, backed by credit dollars, will turn the pendulum in the direction of business recovery, according to a statement given out by the directors of the Society of Industrial Engineers, at its convention at Washington.

"The key log of the jam is unemployment. Give the workers work to do, and they will buy. Business executives must take courageous action now. They must drag the idle credit dollars from the vaults and get them back to their jobs."



particularly technological unemployment, over to social workers to handle. It has become a major business problem, intimately tied in with turnover of money in the market place. Unemployment, when it comes, is a problem for the social worker. But the responsibility for preventing unemployment, of protecting every man and woman who sincerely wants to work, from the cruelty of the bread line and traffic jam at public employment agencies, rests on business and industry."

The convention, attended by approximately 300 delegates, was given over to a wide range of subjects, and, as the society alliteratively termed it, had for its background material, machines and men. Industrial coordination, industrial stabilization, industrial profit-making, how the Government is organized to help industry and what industry has gained by cooperating with Government agencies were treated by prominent speakers from all sections of the country. The general theme of the convention was "Industrial America." The president of the society is John M. Carmody, Chicago, editor of *Factory and Industrial Management*. He was reelected and he reappointed all the incumbent officers, while the same board of directors was continued in office.

President Hoover Lauds Emerson

One highlight of the convention was the annual dinner Thursday. It was in the nature of a testimonial to Har-

ington Emerson, New York, a founder of the efficiency movement, internationally known industrial counselor, pioneer and educator. At the dinner, C. E. Knoeppel, industrial counsel, Cleveland, acting for present and former associates, presented the Harrington Emerson Trophy to the society, which Mr. Emerson helped to form and of which he is a national director. The trophy is to be presented each year to the chapter doing the most noteworthy work. Mr. Emerson in responding to tributes paid to him spoke of "What Is Ahead of Us." Among the tributes to Mr. Emerson was a message from President Hoover. "It is fitting that we honor those who make outstanding contributions to our national progress," the message said. "Harrington Emerson was among the first to call the attention of the nation to the great importance of waste elimination in industry. He has been a leader in the effort to raise our standards of living to higher and higher levels."

The President received the delegates at the White House last Wednesday, while on the subsequent day Mrs. Hoover received wives of the delegates at the White House.

Normalcy by Next Autumn

In a paper on "Forecasting Money and Markets," Laurence H. Sloan, vice-president, Standard Statistics Co., New York, said that by not later than autumn of next year it is expected the productive curve will have crossed the normal line and will consistently remain in such a relatively favorable position during the last few months of that year. Alvan T. Simonds, president, Simonds Saw & Steel Co., Fitchburg, Mass., speaking on "Maintaining Business on an Even Keel," said the business man should be an industrial engineer. The modern art of forecasting, he declared, is now so far developed that there can be no excuse for not foreseeing the major movements of the business and stock market cycle. Application of engineering technique to business affairs is the application of scientific principles and measurable procedure to business problems, said Prof. Walter Rautenstrauch, Columbia University, who spoke on "Applying an Engineering Technique to Profit Making." The profits of industry, he stated, are conditioned by factors in the world at large; by factors in the industry as a whole and by factors in the particular business.

Much progress has been made in application of wage incentives to the non-productive workers in the factory, said Paul T. Norton, professor of industrial engineering, Virginia Polytechnic Institute, Blackburg, Va. Little progress has been made in designing plans which are better fitted to the problem than those in use which were designed primarily for productive workers, he added. Stewart Lowry, head of the incentive department, Proctor & Gamble Co., Cincinnati, talked on "Maintenance Incentives."

Ray M. Hudson, industrial executive of the New England Council, Boston, speaking on "Our Materials," said the finding of a better balance between supply and demand is an industrial problem which must be solved by the engineer. He declared that such a balance would eliminate present gigantic wastes. It was urged by Mr. Hudson that the manufacturer and his

sources of supply get together and determine accurately the exact needs of the producer.

Urges Need of Motion-Mindedness

Under the topic, "Present Status of Time Study and Wage Incentive," Harry Ford, Cadillac Motor Car Co., Detroit, emphasized the importance of getting both management and men "motion-minded." Study of methods of performing operations, he said, has led the Cadillac organization into the field of micro-motion study. The work done along these lines has come through a desire to find the best way of doing the work rather than through a desire to set more accurate time standards. The economies the company has effected through studies of this nature, Mr. Ford stated, are of such a type that he felt they could not have been effected through any other means.

"What we are really after," said Mr. Ford, "is to make our organization motion-minded so that we may all realize the savings which can be effected through the application of better motion practice. With this as our object, we started out by teaching the fundamental principles of motion economy to our foremen, time-study men and tool engineers. We do not feel that the scope of this work is limited to any particular department or types of departments. We have found it to be just as applicable to machine shop work as to assembly operations."

There is considerable opportunity in the field of motion study along the lines of loading and unloading work in machines and machine fixtures, in the estimation of Mr. Ford, who referred to the design of the fixture or machine and the method employed in placing the part to be machined.

Metallurgists Reveal Progress in Open-Hearth, Iron-Manganese and Rustless Steel Research

IMPRESSIVE emphasis on the theoretical and practical value of research in metallurgy was the feature of a notable meeting in Pittsburgh last week. It was the fourth open meeting of the Metallurgical Advisory Board of the Carnegie Institute of Technology and the Pittsburgh Experiment Station of the United States Bureau of Mines. Reports of the work during the past year of these two institutions were publicly presented in the auditorium of the Bureau on Friday, Oct. 17.

Attendance reached a new record. At the first meeting in 1927, the registration was 68; in 1928 it was 192; in 1929 it attained 214 and last week there was the large total of 347. There are 25 members of the advisory board with six ex-officio members, all leading steel officials and metallurgists from the Pittsburgh and Cleveland districts. The chairman is Dr. F. N. Speller, director, department of metallurgy and research, National Tube Co., Pittsburgh.

Research in Open-Hearth Steel

UNDOUBTEDLY the feature of the day's sessions was the afternoon program devoted to research on open-hearth reactions and practice, the leader of which is Dr. C. H. Herty, Jr., physical chemist of the Bureau of Mines, whose work and that of his associates has gained international recognition.

With R. E. Zimmerman, assistant to the vice-president, American Sheet & Tin Plate Co., and a member of the advisory board, presiding, the program was introduced by an "Illustrated Report on Slag Viscosity and Deoxidation with Aluminum-Silicon

Alloys," presented by Dr. Herty, followed by an "Illustrated Progress Report on Fundamental Studies in the Laboratory," delivered by Dr. Herty and Dr. G. A. Fitterer, assistant metallurgist.

Under the latter topic, five reports were offered, three presented by Dr. Fitterer and two by Dr. Herty: "The Electrolytic Method for Determining Inclusions in Steel," "Deoxidation with Manganese, Including the System MnO-FeO"; "Deoxidation with Manganese-Silicon Alloys, Including the System FeO-MnO-SiO₂"; "The Aluminum Method for Determining Iron Oxide in Liquid Steel," and "The Equilibrium Between Carbon and Iron Oxide in Liquid Steel."

Inclusions Determined Electrolytically

The features of these five special reports were the one on the electrolytic method of determining inclusions and the aluminum method of determining iron oxide in liquid steel. Dr. Herty explained in detail the first of these, stating that it is now possible to ascertain quickly, easily and accurately the amount of inclusions in a sample of steel, and he dwelt on the importance and practical value of the established new method.

Dr. Herty emphasized also the importance and value of the new method of ascertaining the amount of iron oxide in liquid steel by the aluminum method—aluminum wire placed in a liquid sample from the furnace takes the oxygen of the FeO to form Al₂O₃, which is easily isolated by chemical analysis.

For years there has been much uncertainty about the quantity of iron oxide and of sonims in the open-hearth

but now it seems established that these can be accurately determined. It has been known that the effects of varying quantities of these factors are what is determining the quality of steel. That it is possible now to more closely regulate the problem of the quantity of these injurious agents, as a result of the work of the Bureau, was pointed out and demonstrated as very near solution.

Constructive discussions were offered by Dr. R. B. Sosman, department of research and technology, United States Steel Corporation, Kearny, N. J.; by Dr. A. B. Kinzel, Union Carbide & Carbon Research Laboratories, Long Island City, N. Y.; by Dr. D. F. McFarland, department of metallurgy, Pennsylvania State College, and by Louis Jordan, Bureau of Standards, Washington.

Late in afternoon the apparatus used in determining slag viscosity, inclusions in steel electrolytically, iron oxide in liquid steel and other features of the work of the Bureau, were shown to visiting metallurgists in the laboratories. Eager advantage was taken of this opportunity.

Deoxidizing Steel with Silico-Spiegel

Following this part of the afternoon program was an "Illustrated Progress Report on Plant Research in the Open-Hearth," also by Dr. Herty. This was presented in two parts: "Deoxidation with Manganese and Silicon in the Open-Hearth Furnace" and "Effect of Inclusions on the Rolling Surface and Physical Properties of Finished Steel."

It has been found by many investigations in steel plant practice that the use of a high manganese, high silicon

alloy or a special silico-spiegel reduces the amount of iron oxide in the bath and meets the specifications for carbon and silicon in the steel with several other metallurgical advantages. The reasons for this and the methods of arriving at the results were fully presented.

Discussion was offered by W. C. Chancellor, superintendent, metallurgical department, National Tube Co., Lorain, Ohio; by J. H. Flaherty, chief metallurgist, Aliquippa Works, Jones & Laughlin Steel Corp., Pittsburgh, and by R. S. Simmons, manager, research department, Pittsburgh Steel Co. Written discussions were read from some German and British authorities.

More Light on the Rustless Steels

ANOTHER feature of the day was a highly valuable contribution to the subject so uppermost in the minds of both metallurgists and users of steel: "Chrome-Nickel Alloys—Constitutional Diagram of 18 Per Cent Chromium-Iron Alloys with Variable Composition of Nickel and Carbon. Disintegration of 18-8 Alloys."

Work on this subject by the Carnegie Institute was presented in an effective and convincing manner by D. V. N. Krivobok, metallurgist of the institute, under whose direction the investigations are proceeding.

Alloys investigated range from 0.046 to 0.34 per cent in carbon, 17.20 to 18.38 per cent in chromium and 7.82 to 8.57 per cent in nickel. A study of the constitutional diagram is presenting data on definite ranges of composition and temperature at which the material remains austenitic and non-magnetic—two essential properties for 18-8. Some conclusions reached are:

(a) After heating for 100 to 250 hr. at 1200 deg. Fahr. (this temperature being within the range at which decomposition occurs) steels become distinctly magnetic. The lower the quenching temperature, the higher the flux density after reheating.

(b) In case of very low-carbon content (in our case 0.046 per cent) the sample is but slightly magnetic until quenching temperature is raised to about 2350 to 2400 deg. Fahr. At this temperature a very perceptible increase in magnetic flux occurs, due, probably, to formation of delta iron. When subjected to 100 to 250 hr. at 1200 deg. Fahr., its magnetic curve shows the same characteristics as the alloys of higher carbon content.

(c) The higher the carbon content, the higher, likewise, is the flux density after reheating, except in case of alloy with 0.23 per cent carbon.

Dr. Krivobok reported that they are investigating some 18-8 alloys to which other elements were added. Some of these "special" alloys show no decomposition at 1200 deg. Fahr. Further work is in progress.

Failures of 18 and 8

The speaker referred frankly to failures of some of the 18-8 materials in service and expressed confidence that present researches will throw

light on the causes and the remedies.

Discussion was offered by Byron B. Morton, Hydro Engineering & Chemical Co., a subsidiary of the Standard Oil Co., and by Dr. H. W. Gillett, director, Battelle Memorial Institute. Mr. Morton alluded to the importance of the work of the institute, particularly in reference to failures in service.

Iron-Manganese Alloys

AFTER an introductory address by Dr. Speller at the morning session, a "Progress Report on the Thermal Analysis of Iron-Manganese Alloys," was presented by the experts of the Carnegie Institute who are working in this field. Dr. F. M. Walters, Jr., outlined in a brief introduction the careful methods used in preparing the Fe-Mn alloys, after which their thermal analysis was discussed by Cyril Wells, followed by a presentation of the crystal structure by Dr. J. B. Friauf and Maxwell Gensamer. An exceedingly clear and effective presentation of the heat treatment and metallography as well as the constitutional diagram of these alloys was given by Dr. V. N. Kribovok.

There were three discussions by Dr. A. B. Kinzel, Union Carbide & Carbon Research Laboratories, Long Island City, N. Y.; by F. T. Sisco, editor, Alloys of Iron Research, Engineering Foundation, and by Dr. Mayo of the Naval Research Laboratory, Washington. The reports as well as the discussions were available in mimeograph form.

A complimentary luncheon was given to visiting metallurgists by Dr. Thomas S. Baker, president of Carnegie Institute, in the Carnegie Union of the Administration Building.

In the evening about 250 attended an informal dinner at the Pittsburgh Athletic Association with Dr. Baker presiding.

Quantity of Steel Used by General Motors

The principal announced speaker was Charles E. Wilson, vice-president, General Motors Corporation, Detroit, and a graduate of the institute in 1909. Discussing the interrelation between the steel and automobile industries, Mr. Wilson stated that if 1,750,000 cars be taken as the average output of his organization per year for the last three years, the following quantities of steel were used for these cars in gross tons:

Alloy steels.....	195,000
Carbon bars and strips....	630,000
Sheet steel.....	425,000
Total.....	1,250,000

These include all cars from the Cadillac down to the Chevrolet.

Contributions which the steel industry has made to the automobile include a sil-chrome valve steel, a more uniform and cleaner steel so that ball bearings now last five to six times longer with the same load as four years ago; a better alloy steel afford-

ing more efficient gears and axles, and rustless steel and chromium plating.

Steels the Automobile Still Needs

AMONG accomplishments of steel to be desired, Mr. Wilson named: A rustless steel or one that will not corrode, always a problem in the automobile; a steel of good machinability, uniform in composition, grain size and Brinell hardness; and a better steel for brake drums—one that is hard and will not score, especially needed because of higher speeds.

A brief but impressive address was delivered by George G. Crawford, president, Jones & Laughlin Steel Corp., in which he urged that there be quick response to the announcement of facts determined by research, less time between this and their application to industry.

Others called upon for brief remarks were S. K. Colby, Aluminum Co. of America; Prof. H. M. Boylston, Case School of Applied Science; A. C. Fieldner, Bureau of Mines, Washington; Dr. A. B. Kinzel, Union Carbide & Carbon Research Laboratories; Edwin F. Cone, THE IRON AGE, New York, and Dr. F. N. Speller.

C. M. Schwab Says Science Will End All Idleness

In his dedicatory address at the opening of the new James Ward Packard Laboratory at Lehigh University, Bethlehem, Pa., on Oct. 15, Charles M. Schwab, who is a trustee of the university, said that the further development of science will provide continuous jobs for all workers.

"Science will cure unemployment," said Mr. Schwab. "New industries will arise from our laboratories. That is the basis of American progress."

"Many of our most active businesses at the present time are the results of recent inventions. Electrification, cellulose products and new developments in the oil refinery field are examples."

"Our industrial expansion will continue as long as the scientists develop new processes and products, creating new demands for employment."

Open-Hearth Operators to Meet in Pittsburgh

A meeting of the open-hearth committee of the American Institute of Mining and Metallurgical Engineers will be held in Pittsburgh, at the William Penn Hotel, on Nov. 19 and 20. This is the regular fall meeting. It will be devoted to the discussion of intimate operating problems, as is the case regularly with these semi-annual meetings. The chairman is Leo F. Reinartz, works manager, American Rolling Mill Co., Middletown, Ohio.

Machine Tool Builders Report Upturn in Demand

JUDGING from the experiences of 1921, 1924 and 1927, the machine tool industry, which this year has been going through its usual triennial slump, should now show an upturn in activity. That such change for the better has actually occurred is suggested by data cited by E. F. DuBrul, general manager, National Machine Tool Builders Association, at the opening session of the twenty-ninth annual convention of that organization held at the Hotel Aspinwall, Lenox, Mass., Oct. 13, 14 and 15. He pointed out that the association's index of machine tool orders was 135.9 for September, compared with 113.8 for August and 91.1 for July, the low point of the year.

"We cannot tell, of course, how fast this trend will increase nor how high it will go," said Mr. DuBrul. "It has been disappointing to find that the slump this summer was worse than in 1927, but comforting to know, on the other hand, that it has turned out to be better than the slump of 1924."

He added the comment that the demand index has again demonstrated the very irregular character of the machine tool business, and emphasized the necessity of recognizing such wide variation as one of the managerial burdens of the industry. Among fundamental elements influencing the participation in any machine tool market, price is the least important, in his opinion. Design, selling efficiency, service and good will are all factors of greater moment. On this he said:

"One cannot participate in any machine tool market unless he has a machine that appeals to the user as being worth the user's money as a productive instrument. This means that his designing must be kept up-to-date. Along with design must go, of course, a recognized quality in materials and workmanship. The design itself will not produce participation equivalent to another machine of comparable design but better quality.

"No matter how good a design, nor how well made the machine may be, its producer will not get as much participation in the market as will the man who is doing a better marketing job on an equal basis of design and quality. Therefore as a reason for participation, we would place selling efficiency second to design.

"The third factor is service. Under this term we would not only class the servicing which a particular type of machine would reasonably be expected

to require in the way of installation, demonstration, etc., but would also class delivery under this heading.

"As the next factor we would list good will, or as the advertising men like to call it, user acceptance. This is built up over a period of years and cannot be won over night any more than design can be changed over night or that service or selling efficiency can be doubled over night. All of these four elements are matters of growth.

"The good will factor is an important influence in the amount of participation which any competitor will get out of a given market. Naturally the new competitor who is not known to the user and who has not established a reputation for design, quality and service is at a disadvantage. He cannot possibly get as much partici-

pation at the same price, or even at a lower price, as the company which has been established for many years.

Price the Last Element Affecting Participation in Machine Tool Market

"Last, and least of all the elements influencing participation, we place price. It is the only element of the five which can be changed over night. It is the only one which, when changed downward, makes it necessary for the competitor to change promptly in order to maintain his relative participation. One of the curses of industrial management is that so many manufacturers do not realize that price is least of the five elements. Therefore we often see price wars which result only in a reduction in the profits of a business with no increase in the physical volume of goods sold by them.

"When the executive realizes that price is the least effective of these five factors in participation, he will use his efforts to improve the other four factors, improving his design, his selling efficiency, his service and delivery and thereby improving his good will as well. These factors are of slow change, but improvements can be made in all of them without arousing competitive reprisals or hard feelings. All good managers recognize that kind of improvement as good business.

"The wise executive will, of course, always insist on a price that will produce a reasonable, rational and sensible profit, that will enable his business not merely to exist, but to grow in service to the customer, and to produce more and better designs as experience indicates can be made and sold at a profit."

Membership Increasing

Net increase of 16 members—18 new members and only two resignations—was revealed in Mr. DuBrul's report to the association. In view of the fact that the past year has been one of business depression and that the association has not solicited new members, the increase of 16 is regarded as reflecting favor for the work of the association.

Last year was characterized as a most successful one in connection with the association's cost work. This activity, under the direction of A. E. Grover, has been outstanding and has attracted considerable attention outside of the association.

"Members making use of Mr.

C. A. JOHNSON AGAIN HEADS MACHINE TOOL BUILDERS

THE National Machine Tool Builders Association in convention at Lenox, Mass., Oct. 13, 14 and 15, reelected C. A. Johnson, president, Gisholt Machine Co., Madison, Wis., as president.

R. M. Gaylord, president, Ingersoll Milling Machine Co., Rockford, Ill., and C. R. Burt, president, Pratt & Whitney Co., Hartford, Conn., were chosen first and second vice-presidents, respectively. G. E. Randles, president, Foote-Burt Co., Cleveland, is treasurer.

New directors are F. H. Chapin, president, National Acme Co., Cleveland; H. S. Beal, assistant general manager, Jones & Lamson Machine Co., Springfield, Vt., and R. A. Heald, secretary, Heald Machine Co., Worcester, Mass.



(Left to Right) C. A. Johnson, R. M. Gaylord and C. R. Burt, president, first vice-president and second vice-president, respectively, of the National Machine Tool Builders' Association.

Grover's service have found it to pay them very well," said Mr. DuBrul. "They get a picture of their costs that they never got before and one that is of great assistance in managing their business. The wise executive has no patience with mere historical records of cost. No matter how simple or how complex, no matter how accurate or how inaccurate, if cost records are not used to control the business, to reduce costs, and to locate leaks in cost, they are simply not worth keeping."

Proceedings of the convention included the election of directors and officers as noted in an accompanying box. The usual group meetings were held, and an afternoon was set aside for golf and other recreation. A formal banquet, with R. E. Flanders, manager Jones & Lamson Machine Co., as toastmaster and C. A. Johnson, president of the association, and W. A. Viall, vice-president Brown & Sharpe Mfg. Co., among the speakers, was a feature.

An outstanding address was that of F. V. Geier, vice-president Cincinnati Milling Machine Co., who, in speaking from "lantern-slide notes" on "The Next Forward Step for the Association—Marketing," presented a report of the board of directors with notable effectiveness. Following this presentation, it was voted to make marketing studies along the lines suggested a major activity of the association. At the same general session, K. H. Condit, editor *American Machinist*, presented some of the results of his journal's 1930 inventory of machine tool equipment in use in various types of metalworking plants.

Sales Expenditures Influence Profits

That profit should at least equal normal conversion cost was reaffirmed by W. L. Churchill, industrial economist, White Plains, N. Y., in an address on "The Laws of the Profits" at the closing session of the convention. Since his talk before the association in 1926 he has discovered, he said, that

this is a natural economic law and not merely a matter of opinion.

"I have also determined that in order to collect the full normal economic profit it is necessary to expend for sales effort an equivalent amount," he continued. "Sales effort parallels profit. You as manufacturers earn your profit through your manufacturing service; you collect this profit through your sales service. The type and character of product have no bearing on the amount of sales effort necessary to sell your normal quota of product at prices that will earn your normal profit requirements. It is this profit requirement that determines the sales effort."

The amount of sales effort, it was pointed out, varies with the type of outlets. It costs more to sell to individual consumers than to retailers; more to sell to retailers than to wholesalers or jobbers. "Manufacturers selling equipment to other manufacturers require to expend for sales effort an amount at least equal to their profit requirement in order to collect such profit," he said.

"Spend one-half of what you should for sales effort and you will be unable to collect more than one-half of the profit that you should collect. Spend one-fourth of what you should for sales effort and you collect no profit whatever. A very large proportion of the business failures and chronic lack of adequate profits is due to failure to expend adequate amount for selling."

At the beginning of his talk Mr. Churchill emphasized the fact that pricing is not a matter of arbitrary policy. There is but one course to pursue in pricing products, he said, and that is to price them so that their sale will assure full economic profit return to stockholders and owners, as well as full profit to the purchasers.

Seventy-five companies were represented at the convention by 133 delegates. The next meeting of the association will be held in May, 1931, at the Hotel Chamberlin-Vanderbilt, Old Point Comfort, Va.



(Left to Right) G. E. Randles, treasurer, and F. H. Chapin, H. S. Beal and R. A. Heald, newly-elected directors of the National Machine Tool Builders' Association

Study on Basic Open-Hearth Slags and Their Charting

PROPOSAL of a method for showing, by diagram, the characteristics of a basic slag was made by Prof. Otakar Quadrat, of the Department of Metallurgy, Technical University, Prague, in a paper read before the (British) Iron and Steel Institute, meeting in Czechoslovakia. His paper was entitled "A Contribution to the Problem of the Analysis of Basic Slags and the Representation of Their Composition in a Triangular Diagram."

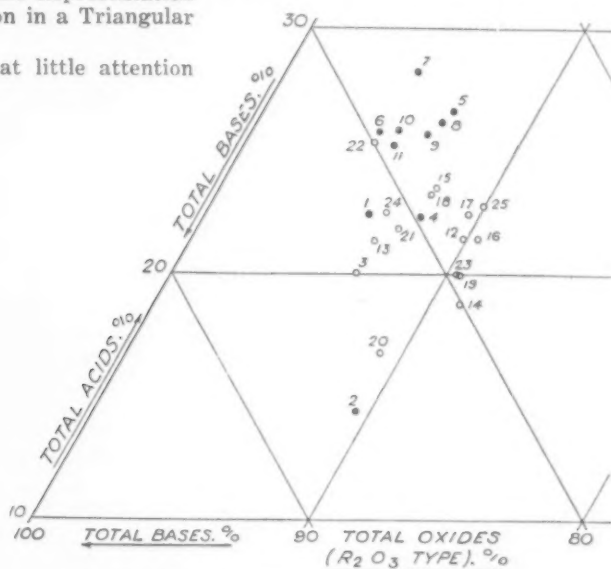
He points out that little attention

phur are determined gravimetrically; the difference between them indicates the content of sulphidic sulphur, *a*. Then the sulphidic sulphur, *b*, is determined iodometrically, by the method mentioned above, in a separate sample of slag, and the bivalent iron contained in the solution of decomposed slag is determined oxidimetrically. For decomposing the slag a mixture

calcium ferrite, which has a lower oxidizing effect than would be exhibited by ferric oxide acting as a base.

In the discussion of this paper several objections were raised to the use of the triangular diagram for open-hearth slags, on the ground that it was either of little value or misleading.

ILLUSTRATION of method of representing on triangular coordinates the compositions of basic open-hearth slags



● Finishing slag from charges of solid pig iron and scrap (Plant A).
○ Finishing slag from charges of molten pig iron and scrap (Plant B).

is paid in literature to an error involved in the determination of ferric oxide and sulphidic sulphur in basic open-hearth slags. The determination of sulphidic sulphur by decomposition of the slag by acid in a current of carbon dioxide, following the usual procedure adopted with an apparatus as used for the determination of sulphur in iron, absorption of the sulphuretted hydrogen in cadmium acetate, iodometric determination of the sulphur, and oxidimetric determination of the bivalent iron, produces results for the sulphur which are too low, while those for the bivalent iron are too high. The content of the trivalent iron, as represented by the difference between the total iron and the bivalent iron, is then lower than the amount actually present.

Method Adopted as Procedure

To obtain accurate figures for ferric oxide and sulphidic sulphur the author has worked out the following procedure:

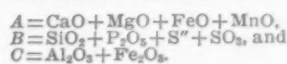
1. Total sulphur and sulphate sul-

phur of dilute sulphuric acid and hydrochloric acid is used.

The difference, *a*—*b*, indicates the amount of sulphidic sulphur, *c*, lost in the iodometric determination. This amount, *c*, is equivalent to that of the trivalent iron reduced when the slag is decomposed. By subtracting this figure from that for the bivalent iron, as determined by titration, the accurate figure for bivalent iron is obtained.

2. For the rapid determination of sulphidic sulphur in slag, the trivalent iron is reduced by zinc powder at an elevated temperature, and the sulphidic sulphur is determined iodometrically in the product of this reaction.

3. Results of the complete analysis of 25 slags are plotted in a triangular diagram, in which the components considered are as follows:



The author draws attention to an apparently labile system, $\text{Fe}_2\text{O}_3 + \text{S}''$, existing in slags, the existence of which he explains by the presence of

Purchasing Agents Discuss Current Buying Problems

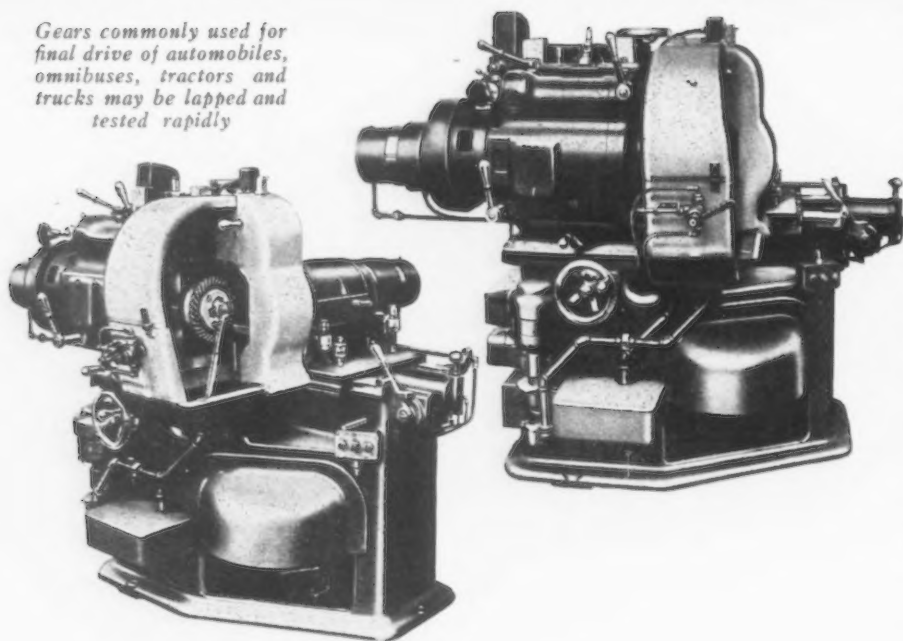
Purchasing problems of the steel, coal and allied industries formed the chief topics of discussion at the sixth district convention of the National Association of Purchasing Agents in Pittsburgh on Oct. 16 and 17. Following the opening address of C. G. Bunnell, purchasing agent, Westinghouse Electric & Mfg. Co., East Pittsburgh, president of the Pittsburgh chapter of the association, individual commodities were discussed by leaders in the respective fields. Mr. Bunnell emphasized the desire of purchasing agents to discuss problems frankly with the salesmen with the hope of establishing a better understanding between the two groups.

Speaking on steel, Dr. John S. Unger, manager, Research Bureau, Carnegie Steel Co., Pittsburgh, stressed the need for a better understanding on the part of salesmen of the product to be sold. He cited numerous instances in which sales representatives had been unable to discuss the properties of their product intelligently and urged a better training for those individuals who are offering a commodity of specialized use.

The work of the Institute of Scrap Iron and Steel, Inc., New York, was outlined by Benjamin Schwartz, director general. He urged purchasing agents to establish contacts with the institute in an effort to solve their problems in the buying and selling of scrap and plead for the abolition of "direct dealing" between producer and consumer.

The coal industry was dealt with by J. D. A. Morrow, president, Pittsburgh Coal Co., Pittsburgh, while H. J. Rose, director of the general laboratories department of the Koppers Co., Pittsburgh, discussed by-product coke. E. R. Norris, general works manager, Westinghouse Electric & Mfg. Co., East Pittsburgh, spoke on machinery and equipment purchases, outlining the complex problems confronting buyers of such specialized products.

Gears commonly used for final drive of automobiles, omnibuses, tractors and trucks may be lapped and tested rapidly



Spiral-Bevel and Hypoid Gear Testing and Lapping Machine

FOR testing and lapping spiral-bevel and hypoid gears on a quantity production basis the Gleason Works, Rochester, N. Y., has developed the 18-in. hydraulically-operated machine here illustrated.

In lapping, the gear and pinion are run together under load with a mixture of abrasive and oil. The pinion drives the gear and as the two rotate the position of the gear is changed continuously and automatically to effect a combined horizontal and vertical movement of the gear relative to the pinion, which results in lapping the entire surface of the teeth. To accomplish this, the gear spindle is journaled in an eccentric sleeve which is oscillated by a separately driven cam.

After the gears are placed on the spindles, operation is entirely automatic. The machine is hydraulically actuated and the automatic features and timing are electrically controlled.

The pinion head is moved into and out of operating position hydraulically, the movement being controlled by two hand levers. One lever chucks the pinion and moves the head in until the pinion is within $\frac{1}{4}$ in. from the gear; the second lever operates a special jogging valve which moves the pinion into mesh, the correct position being determined by a positive stop. When the gears are in position the lapping guard is swung up, closing the electrical circuit so the machine can be started by pushing the starting button. The machine will stop if the guards are opened while the machine is running.

The automatic control mechanism provided for timing the lapping opera-

tion also functions to shift the lapping cams. It reverses the direction of rotation of the gears after they have been run in one direction a predetermined length of time, and stops the gears after they have been run in the reverse direction a predetermined length of time. A different movement is required for each side of the teeth. This involves a mechanism that will lift the cam roller, shift the cam and reverse the drive motor and finally, when the second side is lapped, stop the machine. The relative time of lapping the two sides may be adjusted from 30 sec. to 33 min. per side, and the total time may be varied.

After the lapping operation, opening of the splash guard automatically moves the pinion head away from the gear head far enough so that the pinion may be removed without interfering with the gear. At the same time the chuck holding the pinion releases. The gear is de-chucked by the movement of hand lever, which also strips it from the arbor.

The base of the machine is made in one piece; it is of heavy box section, reinforced with ribbing. The bearing ways on the frame are of liberal width and narrow guides give close alignment. The ways have rectangular taper gibs to take up wear and are protected from abrasive and dirt. The driven head is mounted on a column which is adjustable horizontally on the frame. The driven head also has vertical adjustment to permit lapping hypoids.

The spindles on which the gears are mounted are bored 2.292 in. at the large end with $\frac{1}{2}$ -in. taper per ft. for 7 in. They are mounted on matched

ball bearings and seals of labyrinth construction are provided to protect the bearings from foreign matter. The noses of the spindles are hardened and the taper holes are ground with the spindles in place in their own bearings, insuring concentricity of the spindle. An adjustable backlash brake operating on the gear spindle is provided to maintain an even load during the lapping operation.

Lapping compound is circulated by a pump unit and a guard is provided to prevent splashing of the lapping compound. Sight oilers facilitate maintaining the proper oil level. These oilers filter the oil before it reaches the bearings.

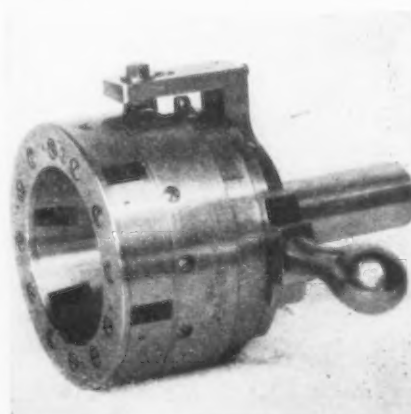
A 5-hp., 1500 or 1800-r.p.m. motor mounted in the base is used for the main drive. Two small motors, one for the oscillating motion and the other for the lapping compound pump, are furnished as standard equipment. Power for operating the hydraulic features is provided by a central hydraulic unit, having a capacity of $2\frac{1}{2}$ gal. of oil per min. at 150 lb. per sq. in. pressure. This unit is not furnished with the machine.

Light-Duty Die Head for Turret Lathes

FOR use on turret lathes, the Eastern Machine Screw Corp., New Haven, Conn., has brought out a die head designated as the No. 10 style D light-duty type. It has been designed especially for cutting threads of large diameter and relatively fine pitch. This die head has a diameter from 2 to 3 in. in pitches not coarser than 10 and for lengths not over $2\frac{1}{4}$ in.

Six chasers make up a set. The chaser cams, solidly supported by the body, engage diagonal slots in the chasers that not only support the chasers directly over the cut but also serve to open the chasers in a positive manner without individual springs. The detachable shank of this die head can be supplied in various diameters. Length-of-thread adjustment is carried on an arm from the shank and adjustment for pitch diameter is by means of a micrometer screw on the front face. Both adjustments may be quickly and easily made.

This new head weighs only 21 lb.



as against more than 40 lb. for a regular 3-in. die head. Outside diameter is 5 $\frac{1}{4}$ in. with an overall, not including shank, of 4 $\frac{7}{16}$ in. The chasers

are easily removed radially simply by depressing a stop plunger. The friction device that holds the chasers in place facilitates installing them.

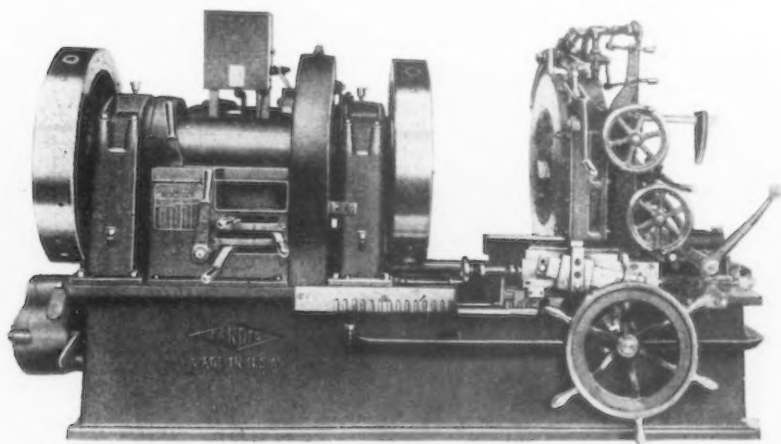
Pipe Machine Cuts Long Tapered Threads on Pipe and Tubing

TO meet exacting requirements in the cutting of long tapered threads on high-pressure pipe and oil tubing, the Landis Machine Co., Waynesboro, Pa., has developed a pipe threading and cutting machine with a receding-chaser two-cut die head and leadscrew attachment.

The receding chaser is emphasized

variation of 0.001 in. in diameter.

The taper mechanism generates a straight line taper or a taper which is uniform throughout the entire thread length. The sine bar is easily and quickly adjusted for all tapers up to and including $\frac{3}{4}$ in. taper per foot, and a plug provides positive means for locating the sine bar for $\frac{3}{16}$, $\frac{1}{8}$



A receding-chaser two-cut die head and leadscrew attachment are used on this pipe threading and cutting machine. Long tapered threads are cut accurately and economically

as making possible the cutting of long lengths of tapered threads with narrower and lower-priced chasers; it also increases the life of the chasers between grinds and reduces the power required for the threading operation.

The 1 $\frac{15}{16}$ in. wide chaser employed has a combination turning and threading throat. The turning section of the throat removes the scale and surplus stock, thus relieving the remaining portion of the chaser of this heavy duty. The same chasers can be used for any pipe size within the range of the die head as long as the pitch, taper and thread form remain constant.

The two-cut die head permits roughing and finishing cuts without changes in the diametrical adjustment. Both cuts are controlled by the one taper mechanism. An independent adjustment of the chaser holders to and from the center assures an equal distribution of the cut. The chaser holders are gibbed and are actuated by the cam ring and tapered rollers mounted on ball bearings. The adjustment for size is universal; in addition there is a universal micrometer adjustment for gage fits. Each graduation on the micrometer dial gives a

and $\frac{3}{4}$ in. tapers. Provision is made for taking up wear.

Adjustment for thread length is simple, and, once set, the adjustment is made permanent by a locking screw. The sine bar retarding bracket, which actuates the taper mechanism, is adjustable for the length of pipe extending beyond the face of the chuck. An automatic safety device releases the sine bar retarding bracket should the operator neglect to open the die head when the leadscrew nut is automatically disengaged at the finish of the thread.

The leadscrew attachment, with change gears for the different pitches, assures proper start of the thread and an accurate lead. The intermediate gears are mounted on a floating carrier of new design, which greatly simplifies the meshing. A single nut clamps the intermediate gears and their carrier in place. The leadscrew nut is of split type. There is an additional segment which can be adjusted longitudinally to eliminate backlash. These three

bronze segments are carried in cast steel jaws and can be replaced when necessary. The leadscrew nut is engaged by hand, and disengaged either automatically at the end of the thread or by hand. A pitch indicator is provided to assist the operator in engaging the leadscrew nut.

Coolant is supplied to the chasers internally through holes in the bore of the die head.

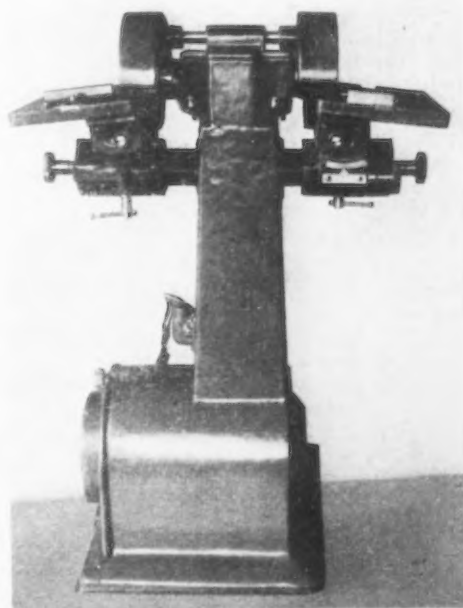
Grinder for Tungsten-Carbide Tools

TO permit the complete grinding of tungsten-carbide tools without the necessity of changing grinding wheels, the Oliver Instrument Co., Adrian, Mich., has developed a double-end machine equipped with two 9-in. diameter 2-in. face cupwheels.

Vibrationless spindle mounting is a feature. The heat-treated steel spindle is mounted in adjustable bronze bearings, which are lubricated from oil wells by means of a wick. The spindle is driven by a 1-hp. motor located in the pedestal base.

Grinding is done free hand, the tool being held against the protractor at the proper angle. The protractor furnished is graduated up to 50 deg. on each side of center. Motor control is of push-button magnetic type with overload and undervoltage protection, arranged for start, reverse or stop; with this arrangement, the grinding wheels can be run in either direction, for grinding right or left-hand tools.

An adjustable table is provided for each wheel. The top of these tables has a guide slot parallel to the wheel face in which a protractor slides and guides the tool accurately. A diamond wheel dresser that also slides in the slot assures that the wheel face is always parallel with the tool guide. The tables are arranged to tilt 25 deg.



The two 9-in. cup wheels permit complete grinding of the tungsten-carbide tools

Six-Spindle Lathe for Work on Centers

A SIX-SPINDLE lathe for work best turned on centers has been developed by the Baird Machine Co., Bridgeport, Conn. The capacity is for work up to 7 in. in diameter and 8 in. long.

Except for the work end, this machine is similar to the Baird six-spindle chucking unit described in *The Iron Age* of Nov. 7, 1929. The center bar of the machine carries a turret equipped with tail-centers; this bar and the turret index with the spindle turret. This tail-center turret is adjustable longitudinally to suit the length of the work.

A feature that increases the accuracy of the work produced is the automatic take-up for looseness or slack on the centers. At each station, the slides that carry the centers are unlocked, the looseness is taken up and the slides again locked, all automatically. A detail that facilitates unloading and loading is that the tail-centers are withdrawn by the operator placing his foot on the treadle, thus leaving both hands free for handling the work. When the machine is arranged for "double indexing," two pieces of work are unloaded and loaded and the turrets index two stations at each cycle. Upon the operator raising his foot from the treadle, one center advances before the other so that he can locate first one piece of work on its center and then the other, doing this more easily and more quickly than if he had to line up two pieces on their respective centers at the same time.

Another important feature is an automatic safety control and machine stop, which is particularly advantageous where the operator attends more than one machine. While the foot treadle is depressed in the ordinary process of reloading the turrets cannot index. Thus possible damage and loss of time is avoided should the operator be late in getting the machine reloaded. Should the operator be late in getting to the machine to unload and reload, the machine would automatically stop when the cycle of operations is completed.

Four longitudinal slides are regularly provided; these are carried on the headstock and tailstock of the machine and receive their motion from the cam drum in the headstock. Through adjustable link connections, each slide may be given the same or a different stroke. When the lathe is set up single indexing, five work stations are available for each piece, four stations being provided with the regular longitudinal tool slides and the fifth station with some other tool arrangement, such as cross-slide or

cross-drilling attachment. Thus the equivalent to five lathe operations or four lathe operations and some other kind of operation is available for each piece. When set up double indexing, two pieces would be unloaded and loaded at each cycle of operations and two work stations or equivalent to two lathe operations would be available for each piece. If required, chucks or other holding fixtures can be used on the spindles in place of and, in some cases, in addition to the centers.

Floor space of 54 x 92 in. is occupied. The net weight of this machine is approximately 12,000 lb.

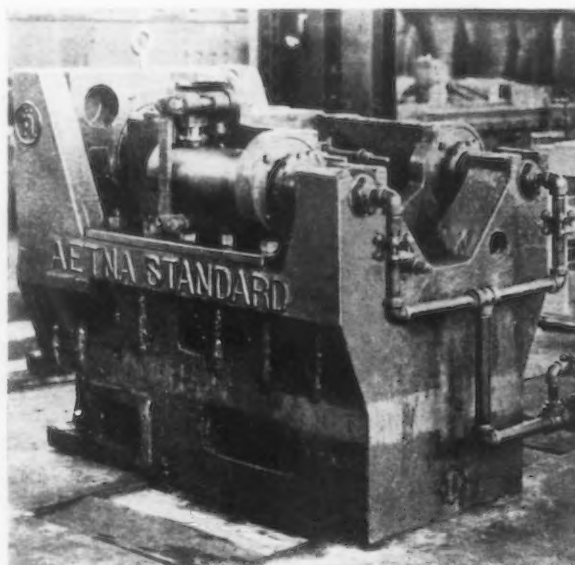
New Bar Pointer for Cold Drawing

TO save in scrap loss in cold drawing bars the Aetna-Standard Engineering Co., Youngstown, Ohio, has brought out the bar push pointer illustrated, for use in connection with

to the dies before the preceding bars have completed the draw. This enables the operator to utilize the drawing time for loading the bench.

The operator has complete control

SELF-CONTAINED bar pointer featuring an automatic grip and easy interchange of die plates



the chain type of bar drawing bench. The pointer incorporates distinct improvements as follows:

Succeeding bars can be brought up

over the pointer and can stop the stroke at will.

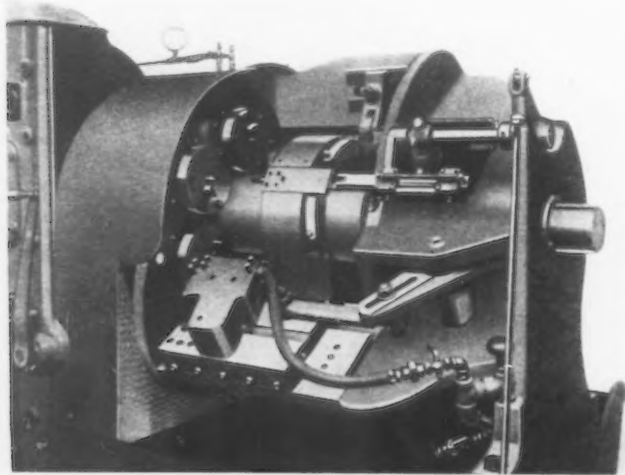
Grip holders and die plates can be quickly interchanged for single, double or triple drawing, to meet the frequent size changes during the day.

Grip operation is automatic.

The machine cannot be overloaded to the breaking point.

It is a self-contained mechanism and hence can be readily installed with existing drawbenches.

CENTER bar carries a turret equipped with tail-centers. An important feature is the automatic take-up for looseness or slack on the centers



"Research for Industry" is the title of a 32-page booklet which discusses the aims and describes the equipment of the new laboratory of the Battelle Memorial Institute, Columbus, Ohio, of which Dr. H. W. Gillett is director. There are numerous illustrations of the building and its various departments which reveal the completeness of the equipment and the beauty of the surroundings.

Bottom May Be Reached Before Year-End

BY LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

FAVORABLE FACTORS

1. Factory payrolls in the United States increased in September; factory employment in New York State gained more than usual.
2. Building activity gained a little in September.
3. Department store sales increased.
4. Merchandise imports increased more than usual for the season in September.
5. Some progress made in liquidating the collateral loans of the banks.
6. Continued progress in the necessary process of curtailment, liquidation, economy and saving.
7. Abandonment of the optimistic "ballyhoo" at Washington.
8. Light mercantile inventories.
9. Strong financial position of most leading companies.

UNFAVORABLE FACTORS

1. Commodity prices continue to decline, including steel scrap.
2. The P-V line reacts and continues below normal.
3. Unfilled orders lower.
4. Factory employment in United States continued to recede in September.
5. Merchandise exports (adjusted) declined in September.
6. Stocks of copper, zinc and some other basic products continue to accumulate.
7. Automobile trade depression is unrelieved.
8. Weakness in the stock and bond markets.
9. Foreign political disturbances.

CHANGES during the month have been partly favorable and partly unfavorable, but the balance appears to remain unfavorable. The most significant favorable developments have been a gain in factory payrolls (adjusted), a small upturn in building activity, a further increase in department store sales, and a greater than usual pick-up in imports in September. Unfavorable developments include further weakness in basic commodity prices, accumulation of stocks of certain basic commodities, continued recession in steel buying, and a relapse in the P-V line.

On the whole, the situation indicates necessity of further curtailment in industrial activity (or a considerable prolongation of the present low level) to restore the balance between supply and demand. It is probable also that a somewhat lower level of commodity prices is in prospect—at least in the case of finished commodities—before markets can regain equilibrium.

No sound condition of business or general business recovery is likely until we see two closely interrelated developments: (1) stocks of basic commodities beginning to decline, and (2) prices of basic commodities, particularly raw materials, rising.

The significance of the September upturn in imports is doubtful. One known item which increased considerably—raw silk—merely indicates Japanese liquidation. Imports of coffee may have increased. Anyhow, imports were about as low as in May, 1922.

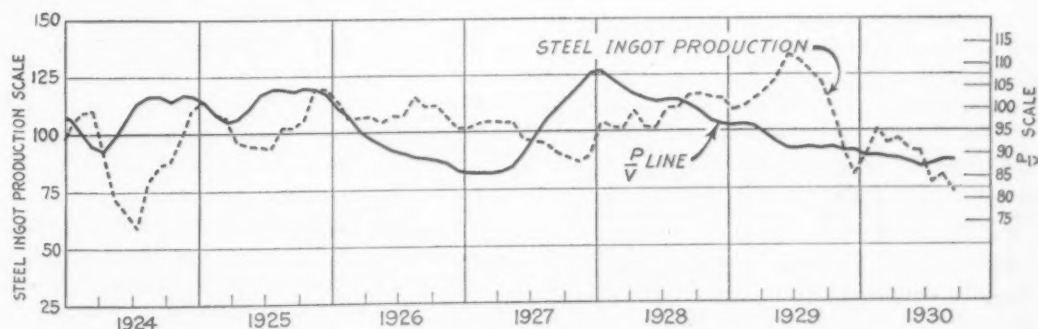
Factory payrolls increased only slightly more

than usual for the season, the gains coming chiefly in the automobile, confectionery and women's clothing industries. Decreases continued in most basic industries. The rise was certainly not due to employment of more laborers, but rather to longer hours or employment of more high-paid laborers. The building figures merely confirm our opinion that this industry is dragging bottom.

As usual, the P-V line tells the story. This barometer reacted slightly in September, as commodity prices declined more sharply than physical volume of trade. This means (1) continued concurrent declines in commodity prices and volume of business, which condition indicates a generally declining level of demand, and (2) a curtailment of physical volume which is not yet sufficient to allow markets to become stabilized.

The P-V line suggests that business activity is near bottom, but it does not yet suggest any sustained recovery. The barometer's past performance indicates that the bottom of the current recession is likely to be reached before the year end, and to be followed by a few months of stabilization at a low level. Much the same conclusions are warranted concerning steel production.

Among the situations in the past, available for comparison, we find that the one existing about March, 1921, appears to be most similar to the present. If, therefore, business could turn the corner by the middle of 1921, why may it not now do likewise by the spring of 1931?



Slight recession in the P-V line (here plotted on 3-month moving average) indicates a further postponement of the date of probable business recovery. An up-grade movement next spring is now suggested.

W. W. MACON
Editor

THE IRON AGE

A. I. FINDLEY
Editor Emeritus

(ESTABLISHED 1855)

Descents and Recoveries

VARIOUS observers have been presenting summaries of the time periods of previous depressions. While they do not agree very closely with each other, there is an adequate consensus of view to indicate that declines in trade activity have really been of distinctly similar duration. The entire period of sub-normal activity is another matter. Having reached a bottom, trade may at once start reviving, but it may be a long or a short time before it has returned to normal. The period of descent, in general, appears to have been approximately twelve months.

There are two ways of fixing the date from which the time of descent should be reckoned, one being to start with the first decline, which is in the majority of cases from a peak, not from a level, the other being to select a time when in the descent trade passed below normal trend line. In the present case the two points are distinctly marked in various indices. The Federal Reserve Board's index of industrial production, adjusted for seasonal variation, shows June, 1929, as clearly the peak month, with 127, both the preceding and the following month being at 124. Constructing a trend line and calling this the peak of a special bulge, the following October was just above the line and November was very decidedly below. Similarly studied, freight car loadings make the same showing, though less emphatic. Accordingly, we have had receding activity for 16 months and have been sub-normal for 12 months.

It can hardly be wholly chance that has made periods of trade recession so nearly uniform in length, and causes indeed are readily recognized. There is a spiral. Lessened activity in one thing brings about lessened activity in another, then again in another, through various reactions, each of which takes time. Everything does not slow down to the full extent at once. There are also the mental reactions. At first many men think it is only a little flurry. Then it looks like a serious flurry, next like a mild depression, next like a severe depression. Or, looking at it another way, there is a gradual reduction of buying power, both individual and corporate, and an increased desire to fortify one's position if possible by paying debts and increasing cash reserves. Some men have been preaching against this, but it is what people do or try to do.

There is good reason both by precedent and by analysis to take it that now, 16 months after trade began to recede and 12 months after it passed below what appears to be normal trend line, recession has approximately run its course, apart from seasonal variation. Recovery is another matter. Precedents, so harmonious as to the time of descent, vary as to recovery. A relatively low level may obtain for

some time, or an upturn may begin almost at once. The upward trend has always been less steep than the previous downward trend. Obviously the causes of depression are created during activity and the causes of recovery are created during depression. The future can be forecast if we can measure the forces operating for recovery and the amount of work they must do to bring about recovery.

Dividing Work and Helping the Workless

NEARLY a year ago President Hoover called business leaders to Washington to formulate plans to minimize the adverse effects of the stock market crash. The program announced called for the maintenance of wage scales and the launching of both public and private work as a means of preventing widespread unemployment and consequent loss of buying power.

In most cases, the promises made at that time were carried out to the extent that business conditions permitted, but the decline in trade became so drastic and proved to be of such world-wide magnitude that there was no alternative, so far as private enterprise was concerned, but to adopt a policy of stringent economy.

Yet even in retrenching, employers have tried to keep unemployment at a minimum. Among iron and steel plants and other branches of the metal-working industry the amount of available work has been divided among as many employees as possible. Of course, with the coming of part-time employment, the stress placed on maintaining wage rates lost its significance. An unchanged wage rate does not protect a man's earnings if he is employed only two or three days a week.

Needless to say, division of available work also has its limits. There is much unemployment and, with repeated prophecies of business recovery unfulfilled and with severe weather approaching, the large amount of enforced idleness has come to be recognized as an emergency problem.

President Hoover's promotion of practical measures to relieve distress during the coming winter will not only meet with wide approval, but will win effective and whole-hearted support from leaders of industry and trade. Charity begins at home and a country known for its generosity to foreign lands in time of need can be counted on to do all that can be done for its own people "to prevent hunger and cold among those who are in honest difficulties."

WAGE reductions have not been general, according to the National Industrial Conference Board. Compilations by the United States Bureau of Labor Statistics, covering more than 3,000,000 wage earners,

show that in the seven months ended July 15 the number of persons affected by wage increases was 31,565, compared with 56,941 affected by reductions. The excess of persons affected by wage decreases over those who received increases was only 25,376, or slightly more than eight-tenths of one per cent of the total number covered in reports to the bureau.

Measuring the Export Decrease

A GOOD measure of the decrease in exports of iron and steel, and manufactures involving iron and steel, is furnished by comparing June and July last year and this. It was after July last year that substantial decreases began, while this year there were further drops after May in most lines. In the majority of lines June and July, both last year and this, ran pretty much together.

Comparison by a single month is inadvisable, as actual shipments are likely to vary even when the general trade does not, hence a two-month comparison is made in the table. Values are given in all cases. While there are tonnage figures for iron and steel items, the importance of totals is impaired by scraps being included, while when values are given this is minimized, as scrap is low priced. The grouping in the table is that of the Department of Commerce.

Iron and steel semi-manufactures run from scrap and pig iron through rolled products, including tin plate. Manufactures include structural steel, whether fabricated or not, rails, pipe, wire, etc.; while advanced manufactures include cutlery, tools, hardware, etc.

Average June and July Exports, 1930, Compared With 1929

	Value per Month	Decrease, Per Cent
Iron and steel, semi-manufactures	\$5,109,209	41.8
Steel mill products, manufactures	5,220,193	37.3
Iron and steel, advanced manufactures	5,557,569	25.4
Electrical machinery and apparatus	9,191,869	14.4
Industrial machinery	19,540,788	14.5
Office appliances	2,857,336	39.5
Printing and bookbinding machinery	1,131,822	27.9
Agricultural machinery and implements	7,600,443	42.4
Automobiles, parts and accessories	18,172,578	60.8
Other vehicles and parts	2,782,765	32.4
Total	\$77,164,572	39.4

A small portion of the total decrease may be ascribed to lower prices, whereby quantity is reduced somewhat less than value. It cannot be said that exports in June and July of last year, from which the above percentage decreases are reckoned, were particularly heavy. At the time it was thought they represented a more or less normal trade, one that could, in general, be maintained indefinitely. Industrial machinery ran in those two months somewhat above the previous average. Automobile exports were lower than early in 1929, but they were higher than the 1928 monthly average.

A little generalization may be ventured when the classes of goods go to different classes of consumers. Agricultural implements and automobiles are bought

by individuals, and it is hardly a chance that gave those two classes the largest percentage decreases of all. A corresponding comparison as to the United States would show much the same thing in general, that buying by the individual has decreased more than buying by business and other organizations.

Price Trends Not Conclusive

WHILE the economists watch price trends closely, they do not usually contend that price movements are a close indicator of what is to come, even in the immediate future. Their principal contention is that trade cannot be expected to mend as long as prices are distinctly trending downward. That, of course, is reasonably obvious. Price declines suggest too large a supply of commodities, as a physical fact, and tend to deter buyers, as a fact of mental conditions.

The latest price statistics require analysis or a wrong conclusion may be drawn. The Bureau of Labor Statistics index number of wholesale commodities declined almost continuously after a peak in September, 1928, at 100.1, to July of this year, when it stood at 84.0. August also showed 84.0 while September is now reported at 84.2. Apparently, then, the decline was fully arrested, but there is a separate index, of all commodities minus farm products and foods. It stood at 84.3 for July, declining to 83.3 for August and to 82.8 for September.

There is no comfort in a sustained average thus produced. Farm products rose from 83.1 in July to 85.3 in September, foods from 86.3 to 89.2. Increased farmer buying power is not indicated and the sum total of farmer buying power relative to total buying power of all the people has been decreasing in the last ten years. The industrial activity of the last few years was not helped by farmer buying to the extent that used to obtain.

Furthermore, the rise from July to September was somewhat greater in foods than in farm products. Clearly the cost of living for everybody was affected adversely more than the farmer position was favorably affected.

As peak prices since 1926 were registered in September, 1928, declines in the ensuing two years, to last month, may be considered in detail. By commodity groups they have been as follows:

Declines September, 1928, to September, 1930

	Per Cent
All commodities	15.8
Farm products	21.6
Foods	16.6
Hides and leather products	17.9
Textile products	21.0
Fuel and lighting materials	10.3
Metals and metal products	8.7
Building materials	8.8
Chemicals and drugs	8.9
Housefurnishing goods	1.9
Miscellaneous	12.5

It would be much better if farm products had not declined so much, particularly when foods did not follow them the whole way, and much better if there had been good-sized declines in building materials and housefurnishing goods. It cannot be seen that the large decline in textile products is doing anyone any good.

CORRESPONDENCE

Still Larger Galvanizing Bath

To the Editor: In your issue of July 24, page 229, you describe a large galvanizing bath built by Thompson Brothers, Bilston, England, and state that it is believed to be the largest galvanizing bath ever produced.

My firm, Wilhelm Ruppmann, Industrieofenbau, Stuttgart, installed a still larger galvanizing bath in Germany 15 years ago. This galvanizing bath has an internal length of 12 m. (39 ft. 4½ in.), width of 1.35 m. (4 ft. 5 in.) and a depth of 1.6 m. (5 ft. 3 in.). Heating was effected by means of producer gas and the waste gas heat was utilized in two recuperators.

WILHELM RUPPMANN.

Stuttgart, Sept. 16.

Control of Mixed Gas Furnaces

To the Editor: The introducing paragraphs of the paper on "Control of Mixed-Gas Furnaces," which you were kind enough to publish in your July 24 issue, may lead to a misunderstanding of the value and applicability of the particular control system described. The people who are interested in this new development in Europe are eager that this be remedied, and it would be very much appreciated if you would print this letter as an additional note on the subject.

In almost all cases, where several gases are used in one furnace, the gases are mixed before entering the furnace. In some cases, the mixing is done before the gas is distributed to the several furnaces, whereas in other cases the individual gases are carried separately to the several furnaces but are also mixed before entering the burners. According to the varying heat and flame

shape requirements at certain times, more of one gas will be admitted to the mixing chamber and the other gas will be throttled, and vice versa. The composition of the gas mixture will change continuously and so will the heating value and the air required to burn the mixture efficiently. This situation makes a sustained correct adjustment of the combustion air extremely difficult.

The new control method regulates automatically the total amount of air required by the gas mixture, no matter in what manner the proportion of the individual gases is changed. The apparatus described calculates automatically the total amount of air which is required at any time by the gas mixture as it changes in its composition and takes care that this amount of air is admitted to the furnace.

KARL A. MAYR.

German Stainless Steel

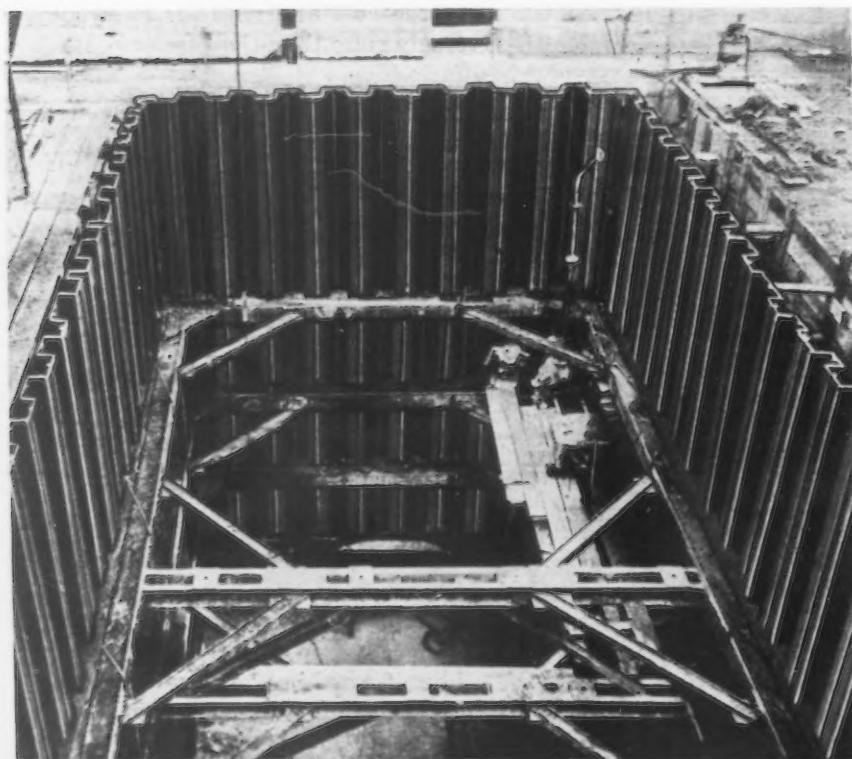
To the Editor: In an article that appeared in THE IRON AGE on Jan. 30, 1930 ("British Version of the Origin of Stainless Steel"), I published my views as to the origin of the Krupp inventions in the field of non-rusting steels. Meanwhile, on the occasion of a visit to Messrs. Krupp at Essen, it has been proved to my satisfaction that the assumptions on which I had based my statements were erroneous and that the inferences I drew from them are therefore unfounded.

I therefore wish to correct my statements as published in THE IRON AGE on Jan. 30, 1930, and beg that you will insert these lines in your journal. In accordance with the above, the action brought by Messrs. Krupp against me and others has resulted in judgment to the effect that the special type of chrome-cobalt steel for cutlery with a carbon content of about 1 per cent, to which reference was made in my article, is covered in Germany by the Krupp patents.

P. R. KUEHNRICH.

Sheffield, England, Sept. 8.

Sheet Piling Widely Used in Germany



SHEET steel piling is being widely used in Germany and other European countries as a substitute for wood construction in dams, piers and along canals. Large quantities have been used on the islands in the North Sea. The accompanying photograph shows the Z-type, modified ball and socket lock steel piling made by the Eisen und Stahlwerk Hoesch of Dortmund, Germany.

The first Z-type piling was made in Luxemburg in 1913 and by 1914 a substantial tonnage was being produced in Germany. Experiments by the Eisen und Stahlwerk Hoesch resulted in the development of a modification of the ball and socket lock in 1928. This piling is furnished painted when for use exposed to the air, or with a copper content of 0.23 to 0.35 per cent when for use in sea water. Three qualities of mild steel are used in the ordinary piling, 37 to 44 kg. per sq. in. and 22 per cent elongation, 40 to 50 kg. per sq. in. tensile strength and 20 per cent elongation, and 50 to 60 kg. per sq. in. with 18 per cent elongation.

Rail Contracts and Structural Awards Are Features

INCREASED railroad buying, heavy awards of structural steel and scattered gains in steel production are favorable developments in an iron and steel market in which pronounced conservatism remains the dominant note.

Rail orders total 71,000 tons, including 45,000 tons bought by the Union Pacific, 16,000 tons by the Atlantic Coast Line and 10,000 tons by the Boston & Maine. The Chicago & North Western is expected to close for 30,000 tons before the end of the week, while the Erie is preparing to buy 40,000 tons.

Concomitant with the current rail buying movement is a revival of interest in railroad equipment, demand for which has been at a low ebb for several months. The Baltimore & Ohio has undertaken the construction of 2000 freight cars, and several other roads are preparing to build or repair rolling stock in their own shops. The Illinois Central, which earlier in the year put out an inquiry for 2300 cars, is revising the specifications for this equipment, evidently with the intention of asking for new figures from car builders. The Santa Fe also is expected to enter the market for cars.

Fabricated steel awards, at 48,000 tons, are the heaviest since mid-July, and the large amount of pending work indicates that steel plants can continue to count on good support from heavy building operations.

Even more heartening to the iron and steel trade than betterment in railroad buying or the maintenance of structural steel demand are evidences that consumption is bumping rock bottom. New buying of finished steel is restricted, but shipments against contracts are holding up rather well. In fact, pressure for deliveries is such as to indicate that steel users are maintaining unusually low inventories.

With the decline in demand, as measured by shipping orders, checked, steel output shows signs of stabilizing. At Chicago, where railroad business is an important factor, ingot output has advanced from 55 to 57 per cent of capacity, and there have also been slight gains at Buffalo and in the Pittsburgh district, but these increases were more than offset by losses elsewhere. Raw steel output for the country at large is estimated at 53 per cent, compared with 55 per cent a week ago.

Tin plate demand and automobile production continue to show seasonal curtailment. Tin mills are now running at 55 per cent of capacity and motor car output for October is lower than in September or August. Some further lengthening out of line pipe

▲ ▲ ▲
DECLINE in Shipping Orders Is Checked—Chicago Steel Output Rises — Scrap Prices Continue to Recede
▼ ▼ ▼

deliveries also is looked for as weather conditions become more severe. But with these exceptions, no market factors are visible that are likely to cause a further reduction in iron and steel consumption.

Little hope is held out for an upturn in general demand so long as business sentiment remains so conservative as at present. What promised to be a normal autumn rise in activity got under way in the first half of September, but was nipped in the bud by a resurgence of extreme caution. September sales of independent sheet manufacturers showed a gain of 43 per cent over August and were the largest for any month since April; yet shipments fell nearly 20 per cent below those of August.

The current attitude of buyers is not unusual in view of recent declines in prices. Downward readjustments in pig iron and steel are in diminishing number, but scrap continues to show pronounced weakness. Heavy melting grade is off 25c. a ton at Pittsburgh and St. Louis and 50c. a ton at Chicago and Detroit.

Reductions of 50c. a ton on Bessemer and malleable pig iron by Pittsburgh and Valley makers restore the usual differentials between those grades and basic and foundry irons. Galvanized sheets are weak, with as low as 2.95c. a lb., Pittsburgh, reported, and automobile body sheets have been sold in some instances at 3.40c., a concession of \$2 a ton. Sales of continuous mill sheets have been made at 1.75c. a lb., Pittsburgh, for No. 10 gage and at 1.90c. for No. 13, or \$1 a ton under the recognized schedule.

Of interest to those who are still looking for signs of business recovery is the record of machine tool orders compiled by the National Machine Tool Builders' Association.

Orders in September gained more than 18 per cent over August, following an increase of 25 per cent in that month over July. The machine tool trade is usually among the first lines of business to show a change in trend.

Another development, which may prove to be of purely seasonal significance, is a moderate gain in pig iron shipments reported at Chicago, Buffalo, Pittsburgh and New York.

THE IRON AGE composite price for steel scrap has declined from \$12.92 to \$12.67 a gross ton, the lowest level since February, 1922. The composites for finished steel and pig iron are unchanged at 2.135c. a lb. and \$16.29 a gross ton respectively. Compared with one year ago, finished steel is down \$4.68 a net ton, while scrap and pig iron are off \$2.75 and \$2.09 a gross ton respectively.

PITTSBURGH

Malleable and Bessemer Pig Iron Reduced— Steel Demand Holding Its Own

PITTSBURGH, Oct. 21.—Steel tonnage releases in this district are holding their own and, in the absence of further curtailment of consumption, local companies are inclined to regard the situation in a more favorable light. New buying is restricted, but consumers show no tendency to reduce shipments against contracts. Urgency for delivery when material is ordered is a constant reminder of the low inventories being maintained by steel users. It is not uncommon for a buyer to place a small order on Friday or Saturday which must be in his plant by Monday if his operations are to be maintained.

Steel ingot operations among the smaller independent companies in this district have gained slightly in the last week, with three furnaces added at two different points. In the meantime, the larger companies have maintained production of raw steel at approximately the same level as last week, and aggregate ingot production in the district is fractionally higher, although still somewhat less than 55 per cent of theoretical capacity.

Finishing mill schedules have changed slightly, but still average about 50 per cent in the aggregate. Tin plate production is declining seasonally, now averaging about 55 per cent. Sheet mills are also off at some points, and activity in seamless line pipe is lower as large orders booked during the summer are completed. To offset this, shape mills are engaged at a higher rate and production of bars has been stepped up at a few plants. The rate of steel consumption by the principal consuming groups reflects very little readjustment, but doubt exists as to the likelihood that the automobile industry will be able to maintain its present rate of requirements. The low production and restricted buying of the principal automobile maker lend credence to the possibility of further curtailment before the end of the year, which can hardly be offset by the heavier production of companies that expect to bring out models early in the new year.

Structural steel demand from public works is holding up, but buying for private projects is very slow. One Eastern road is about to inquire for rails, but other roads are still backward in making known their 1931 requirements. In the meantime, specifications for track accessories are exceptionally light even for this season of the year, and little car building is in prospect. The Baltimore & Ohio has authorized the building of 2000 freight cars. Prospects for considerable barge buying continue fairly

Valley and Pittsburgh furnaces reduce prices of malleable and Bessemer pig iron 50c. a ton.

* * *

Steel tonnage releases holding their own, with slight gains at some of the smaller mills.

* * *

Activity in tin plate and line pipe decreasing, but structural mills are busy.

* * *

Prices on finished steel still influenced by keen competition for orders.

* * *

Scrap prices decline moderately because of lack of important buying.

good, but definite inquiries are slow in coming out.

The opinion is frequently voiced that when steel buying is resumed the comeback will be very rapid, and this possibility may be responsible for the fact that large steel producers are accumulating both steel ingots and pig iron at a number of points. This practice cannot be continued indefinitely unless business is resumed, and a sharp cut before the end of the year would not be surprising.

Prices on finished steel have not changed and are still rather weak on some products, particularly those going to the automobile industry. New minimum figures on the various finishes of sheets have been reported from Detroit, and shading of strip quotations is not entirely lacking even at recently reduced levels. Mills continue their efforts to maintain official quotations on nearly all products, but are meeting with little success in the case of bars and sheet steel. The new price on tin plate has not yet been tested by substantial contract purchases.

In the primary markets Bessemer and malleable pig iron have declined 50c. a ton, while scrap has eased off slightly in the absence of substantial mill purchases.

Pig Iron

Valley and Pittsburgh makers of Bessemer and malleable iron have reduced prices 50c. a ton to \$17.50, Valley, and \$18, Pittsburgh furnace. These changes reestablish the differentials between grades which have prevailed for the last two or three years. The present quotations on basic iron are strictly nominal and could hardly be called makers' asking prices if substantial tonnages were offered.

The Pittsburgh furnace has not heretofore been a factor in the Bessemer market and, with freight rates ranging from 63c. to \$1.13 to Pittsburgh district consuming points, it is able to deliver Bessemer iron at a lower figure than Valley furnaces which are quoting \$17.50 with a \$1.76 freight rate. In the Valley territory the \$17.50 price is well maintained on this grade of iron, and no instances of shading \$18, Pittsburgh furnace, are reported in the Pittsburgh territory.

Sales are still confined to small lots, and split carloads of two grades of iron are not uncommon. Merchant furnaces do not have large stocks of foundry, malleable and Bessemer iron, although large piles of basic in the yards of most of the larger steel companies in the district are a constant threat to the stability of the market on this grade. Pig iron shipments in October are running slightly ahead of those of September with two or three producers, but the increase is not of sufficient size to warrant the blowing in of merchant stacks for several weeks. One of the Hubbard, Ohio, furnaces of the Youngstown Sheet & Tube Co., which has been banked, is again in blast.

Prices per gross ton, f.o.b. Valley furnace:	
Basic	\$17.00
Bessemer	17.50
Gray forge	16.50
No. 2 foundry	17.00
No. 3 foundry	16.50
Malleable	17.50
Low phos., copper free	\$26.66 to 27.00

Freight rate to Pittsburgh or Cleveland district, \$1.76.

Prices per gross ton, f.o.b. Pittsburgh district furnace:	
Basic	\$17.50
No. 2 foundry	17.50
No. 3 foundry	17.00
Malleable	18.00
Bessemer	18.00

Freight rates to points in Pittsburgh district range from 63c. to \$1.13.

Bars, Plates and Shapes

Prospective structural tonnage is still the bright spot of the market on heavy hot-rolled products, as demand for merchant bars is very light and little plate work is coming before the trade. Structural awards are confined principally to public works and improvements, with bridges dominating. The Ardmore Boulevard bridge in Pittsburgh, requiring 760 tons of structural steel and about 1000 tons of reinforcing bars, has been awarded to a local fabricator. A Valley shop has taken 850 tons of shapes for the Youngstown filtration plant. Considerable shape tonnage is still pending in this district, as well as in Tennessee and Kentucky, where not all the recent inquiries for highway bridges have been closed. Bridge work is also taking a considerable tonnage of rein-

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	Oct. 21, 1930	Oct. 14, 1930	Sept. 23, 1930	Oct. 22, 1929
No. 2 fdy., Philadelphia.....	\$18.76	\$18.76	\$19.26	\$21.26
No. 2, Valley furnace.....	17.00	17.00	17.50	18.50
No. 2 Southern, Cin'ti.....	15.19	15.19	15.19	17.69
No. 2, Birmingham.....	14.00	14.00	14.00	14.50
No. 2 foundry, Chicago.....	17.50	17.50	17.50	20.00
Basic, del'd eastern Pa.....	17.75	17.75	18.75	19.75
Basic, Valley furnace.....	17.00	17.00	17.00	18.50
Valley Bessemer, del'd P'gh..	19.26	19.76	19.76	20.76
Malleable, Chicago.....	17.50	17.50	17.50	20.00
Malleable, Valley.....	17.50	18.00	18.00	19.00
L. S. charcoal, Chicago.....	27.04	27.04	27.04	27.04
Ferromanganese, furnace....	94.00	94.00	94.00	105.00

Rails, Billets, etc., Per Gross Ton:	Oct. 21, 1930	Oct. 14, 1930	Sept. 23, 1930	Oct. 22, 1929
Rails, heavy, at mill.....	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.....	36.00	36.00	36.00	36.00
Rerolling billets, Pittsburgh.	31.00	31.00	31.00	35.00
Sheet bars, Pittsburgh.....	31.00	31.00	31.00	35.00
Slabs, Pittsburgh.....	31.00	31.00	31.00	35.00
Forging billets, Pittsburgh....	36.00	36.00	36.00	40.00
Wire rods, Pittsburgh.....	36.00	36.00	36.00	40.00
Skelp, grvd. steel, P'gh, lb...	1.60	1.60	1.70	1.85

Finished Steel, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.60	1.60	1.60	1.90
Bars, Chicago.....	1.70	1.70	1.70	2.00
Bars, Cleveland.....	1.65	1.65	1.65	1.90
Bars, New York.....	1.93	1.93	1.98	2.24
Tank plates, Pittsburgh.....	1.60	1.60	1.60	1.95
Tank plates, Chicago.....	1.70	1.70	1.70	2.05
Tank plates, New York.....	1.88	1.88	1.88	2.22½
Structural shapes, Pittsburgh.	1.60	1.60	1.60	1.90
Structural shapes, Chicago...	1.70	1.70	1.70	2.00
Structural shapes, New York.	1.85½	1.85½	1.85½	2.14½
Cold-finished bars, Pittsburgh.	2.10	2.10	2.10	2.30
Hot-rolled strips, Pittsburgh.	1.60	1.60	1.65	1.90
Cold-rolled strips, Pittsburgh	2.35	2.35	2.35	2.75

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Finished Steel, Per Lb. to Large Buyers:	Oct. 21, 1930	Oct. 14, 1930	Sept. 23, 1930	Oct. 22, 1929
Sheets, black, No. 24, P'gh..	2.35	2.35	2.45	2.75
Sheets, black, No. 24, Chicago	2.55	2.55	2.55	2.95
dist. mill.....	3.00	3.00	3.00	3.50
Sheets, galv., No. 24, P'gh..	3.10	3.10	3.10	3.60
Sheets, galv., No. 24, Chicago	2.05	2.05	2.05	2.35
dist. mill.....	2.25	2.25	2.25	2.45
Wire nails, Pittsburgh.....	2.00	2.00	2.00	2.40
Wire nails, Chicago dist. mill.	2.05	2.05	2.10	2.45
Plain wire, Pittsburgh.....	2.30	2.30	2.30	2.40
Plain wire, Chicago dist. mill.	2.35	2.35	2.35	2.40
Barbed wire, galv., P'gh.....	2.70	2.70	2.70	3.05
Barbed wire, galv., Chicago	2.85	2.85	2.85	3.15
dist. mill.....	5.00	5.00	5.25	5.35
Tin plate, 100 lb. box, P'gh..				

Old Material, Per Gross Ton:	Oct. 21, 1930	Oct. 14, 1930	Sept. 23, 1930	Oct. 22, 1929
Heavy melting steel, P'gh....	\$14.50	\$14.75	\$15.75	\$17.25
Heavy melting steel, Phila....	12.50	12.50	13.00	15.50
Heavy melting steel, Ch'go....	11.00	11.50	12.50	14.25
Carwheels, Chicago.....	13.00	13.50	13.50	14.00
Carwheels, Philadelphia.....	15.00	15.00	15.00	16.50
No. 1 cast, Pittsburgh.....	13.25	13.25	13.50	15.50
No. 1 cast, Philadelphia.....	13.00	13.00	13.00	16.00
No. 1 cast, Ch'go (net ton)...	10.50	11.00	11.00	14.50
No. 1 RR. wrot., Phila.....	15.00	15.00	15.00	16.00
No. 1 RR. wrot., Ch'go (net)...	9.25	9.25	10.00	14.00

Coke, Connellsville, Per Net Ton at Oven:	Oct. 21, 1930	Oct. 14, 1930	Sept. 23, 1930	Oct. 22, 1929
Furnace coke, prompt.....	\$2.60	\$2.60	\$2.60	\$2.65
Foundry coke, prompt.....	3.50	3.50	3.50	3.75

Metals, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.....	10.12½	10.12½	10.50	18.12½
Electrolytic copper, refinery..	9.75	9.75	10.25	17.75
Tin (Straits), New York.....	27.12½	24.62½	29.75	41.37½
Zinc, East St. Louis.....	4.00	4.00	4.25	6.70
Zinc, New York.....	4.35	4.35	4.60	7.05
Lead, St. Louis.....	4.95	4.95	5.35	6.70
Lead, New York.....	5.10	5.10	5.50	6.90
Antimony (Asiatic), N. Y....	7.37½	7.25	7.62½	8.75

forcing bars, recent awards having been a bridge at Knoxville, Tenn., taking 1500 tons, and a medical building in Pittsburgh, requiring 500 tons. Following the award of 2000 tons of plates for barge work last week, no sizable inquiries are reported, but the prospective building of 2000 freight cars by the Baltimore & Ohio Railroad is of interest to the market.

Prices on heavy hot-rolled products show no material change, with plates and shapes quoted at 1.60c., Pittsburgh, and bars at 1.60c. to 1.65c. The higher figure applies to small tonnages, although it represents the official quotation of the larger mills in the district.

Semi-Finished Steel

Nothing has occurred in the last week to arouse this market from the dullness which has prevailed for several months. Consumers are still receiving material on old orders at prices based on the current quotation of \$31, Pittsburgh or Youngstown, on billets, slabs and sheet bars. Shipments are light and unsteady, due to the intermittent operations of the smaller sheet and strip mills in this district. Forging billets are in light demand, and occasional spot sales are bringing \$36, Pittsburgh. The same

price is still the nominal market on wire rods, demand for which is holding at about the September level.

Tin Plate

Consumers have shown little interest in forward buying as yet. Mill representatives have generally completed their early canvassing of the trade, but container manufacturers are interested in reducing their inventories and are apparently not yet ready to discuss 1931 contracts. Specifications are also lighter and production has tapered off further. The operating rate of the leading interest will fall under 60 per cent this week and the average for the industry is less than 55 per cent. No test of the recently announced official price is reported.

Strip Steel

Tonnage releases in the first half of the month fell behind the corresponding September period with some companies, while others report approximately the same business. With little demand coming from the automobile industry, miscellaneous tonnage from diversified sources does not build up impressive totals and operations average 35 to 40 per cent. Hot-rolled strip is holding at 1.60c.

and 1.70c., Pittsburgh, but shading of \$1 a ton is heard from the Detroit territory. Higher figures are disappearing, but occasional small lots are bringing 1.65c. and 1.75c. Cold-rolled strip is well established at 2.35c., Pittsburgh or Cleveland.

Rail and Track Accessories

Eastern roads are still rather slow in making known their 1931 rail requirements, although the Erie Railroad is expected to come into the market soon for 40,000 tons. The Chesapeake & Ohio has not closed against tie plates and other track fastenings to accompany its recent rail order. Otherwise the market is very quiet, and specifications for rails and accessories are exceptionally light. The larger roads, which ordinarily take options on heavier tonnages of rails than they actually purchase, are reported not to have exercised those options to any large extent this year. Prices on accessories are well maintained in view of light purchases.

Tubular Goods

Despite reports of seasonal improvement in demand for standard building pipe, aggregate orders so far this month are no larger than they were in September. Colder weather may de-

THE IRON AGE COMPOSITE PRICES

Finished Steel		Pig Iron		Steel Scrap	
Oct. 14, 1930	2.135c. a Lb.	\$16.29 a Gross Ton		\$12.67 a Gross Ton	
One week ago	2.135c.	16.29		12.92	
One month ago	2.149c.	16.46		13.75	
One year ago	2.369c.	18.38		15.67	
Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.		Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.		Based on heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.	
HIGH		HIGH		HIGH	
1930.....	2.362c., Jan. 7	18.21, Jan. 7	16.29, Oct. 14	15.00, Feb. 18	12.67, Oct. 21
1929.....	2.412c., April 2	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928.....	2.391c., Dec. 11	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927.....	2.453c., Jan. 4	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22
1926.....	2.453c., Jan. 5	21.54, Jan. 5	19.46, July 13	17.25, Jan. 5	14.00, June 1
1925.....	2.560c., Jan. 6	22.50, Jan. 13	18.96, July 7	20.83, Jan. 13	15.08, May 5
LOW		LOW		LOW	
	2.135c., Oct. 14				
	2.362c., Oct. 29				
	2.314c., Jan. 3				
	2.293c., Oct. 25				
	2.403c., May 18				
	2.396c., Aug. 18				

velop some tonnage in the next month or two, but operations are not expected to increase beyond the 35 to 40 per cent rate which is in effect at the present time. Production of lapweld pipe is at about the same level, while activity in seamless material is gradually tapering off as orders taken during the summer are completed. Electric-weld mills are probably running at a higher rate than any of the pipe departments, and some business in the smaller sizes of this material is being taken. Mechanical tubing is very dull. The same is true of oil country casing and boiler tubes.

Wire Products

No particular change is reported in demand for merchant wire products, and manufacturers' wire is hardly as active as it was last month. Jobbers seem to be well stocked with barbed wire and nails, and shipments of fencing to the South and Southwest are not so heavy as usual. In the Pittsburgh district nail prices are holding at \$2 a keg, despite reports of concessions in other territories. Bright hard wire is holding at 2.30c., Pittsburgh.

Cold-Finished Bars

No improvement is reported and, with demand from the automobile industry even lighter than it was last month, some mills report a decrease in shipments. Operations are at not more than 35 per cent of capacity, and the price is unchanged at 2.10c., Pittsburgh.

Sheets

Specifications last week showed no appreciable improvement, and little new business is reported. Heavier forward bookings during September are not yet reflected in larger releases this month, and the opinion is growing that part of the contract buying last month may have been of a speculative nature. Considering the weakness of prices at present, such speculation may not all have been of benefit to the consumer. No change is reported in the rate of sheet consumption by the principal consuming industries. Buying by the automobile makers is negligible, although heavier production by one or two companies is expected in November because of the introduction of new models.

Prices are weak, but show no quotable change. The tonnage of galvanized going at 3.10c., Pittsburgh, is diminishing and prices lower than 3c. are heard occasionally. Automobile body sheets have been sold in comparatively small tonnages at 3.40c., and many makers are not trying to get more than 3.50c.

Coal and Coke

Despite sharp drops in temperature in the last few days the market for coal and coke has shown little improvement. Domestic coke dealers seem to be stocked sufficiently to take care of early increases in consumer demand and foundry and furnace coke are just as dull as they have been. Dealers are no longer asking more than \$2.60, Connellsville, for the furnace grade and sales at less are not entirely lacking. No change is reported in foundry prices. The coal market is still depressed by heavy tonnage of slack on track and sales have been made at as low as 35c. a ton on steam slack. Coal prices are weak.

Warehouse Prices, f.o.b. Pittsburgh

	*Base per Lb.
Plates.....	2.85c.
Structural shapes.....	2.85c.
Soft steel bars and small shapes.....	2.75c.
Reinforcing steel bars.....	2.75c.
Cold finished and screw stock—	
Rounds and hexagons.....	3.35c.
Squares and flats.....	3.85c.
Bands.....	3.10c.
Hoops.....	4.10c.
Black sheets (No. 24), 25 or more bundles.....	3.25c.
Galv. sheets (No. 24), 25 or more bundles.....	3.85c.
Light plates, blue annealed (No. 10), 1 to 24 plates.....	2.50c.
Blue annealed sheets (No. 13).....	2.65c.
Galv. corrug. sheets (No. 28), per square.....	4.25c.
Spikes, large.....	3.40c.
Small.....	3.80c. to 5.25c.
Boat.....	3.80c.
Track bolts, all sizes, per 100 count, 60 and 10 per cent off list	
Machine bolts, 100 count, 60 and 10 per cent off list	
Carriage bolts, 100 count, 60 and 10 per cent off list	
Nuts, all styles, 100 count, 60 and 10 per cent off list	
Large rivets, base per 100 lb.	\$3.30
Wire, black, soft ann'd, base per 100 lb.....	\$2.60 to 2.70
Wire, galv. soft, base per 100 lb.....	3.20 to 3.30
Common wire nails, per keg	2.35
Cement coated nails, per keg	2.65 to 2.80

*On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 3999 lb.

Old Material

With small purchases of No. 1 heavy melting steel, hydraulic compressed sheets and scrap rails by at least one mill in the district, the scrap market has eased off slightly in the last week, but it is stronger at present levels than it was at the nominal quotations which have prevailed since the first of the month. Scrap buying by a large consumer, which has been anticipated for some time by local dealers, has not yet materialized, and developments at that point will likely move the market in one direction or the other within the next week. Slight increases in open-hearth operations at two plants have given the market a better tone, and most of the principal consuming points are now taking shipments in a limited way.

Sales of heavy melting steel during the week were at \$14.50 and \$14.75, while hydraulic compressed sheets and rails were sold at \$14.50. In most cases these figures represent the top of the market, although a few sales of steel are said to have been made at \$15. Changes in the other grades of scrap have largely reflected the trend in the heavy tonnage items.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel.....	\$14.25 to \$14.75
No. 2 heavy melting steel.....	11.50 to 12.00
Scrap rails.....	14.00 to 14.50
Compressed sheet steel.....	14.00 to 14.50
Bundled sheets, sides and ends.....	12.50 to 13.00
Cast iron carwheels.....	14.00 to 14.50
Sheet bar crops, ordinary.....	15.00 to 15.50
Heavy breakable cast.....	10.00 to 10.50
No. 2 railroad wrought.....	14.25 to 14.75
Hvy. steel axle turnings.....	12.00 to 12.50
Machine shop turnings.....	7.00 to 7.50
Acid Open-Hearth Grades:	
Railr. knuckles and couplers.....	17.00 to 17.50
Railr. coil and leaf springs.....	17.00 to 17.50
Rolled steel wheels.....	17.00 to 17.50
Low phos. billet and bloom ends.....	19.00 to 20.00
Low phos. mill plates.....	16.50 to 17.00
Low phos. light grades.....	16.50 to 17.00
Low phos. sheet bar crops.....	17.00 to 18.00
Heavy steel axle turnings.....	12.00 to 12.50
Electric Furnace Grades:	
Low phos. punchings.....	16.50 to 17.00
Heavy steel axle turnings.....	12.00 to 12.50
Blast Furnace Grades:	
Short shoveling steel turnings.....	8.00 to 8.50
Short mixed borings and turnings.....	8.00 to 8.50
Cast iron borings.....	8.00 to 8.50
Rolling Mill Grades:	
Steel car axles.....	20.50 to 21.00
Cupola Grades:	
No. 1 cast.....	13.00 to 13.50
Rails 3 ft. and under.....	15.50 to 16.00

CHICAGO

Ingot Output Regains Recent Lost Ground— Railroad Buying More Promising

CHICAGO, Oct. 21. — Indicated growth in railroad interest in iron and steel use, somewhat heavier specifications from the general manufacturing trade and the regaining of recent lost ground in ingot production are favorable factors which are appearing in the Western market.

New orders for rails and track supplies total 50,000 tons and several new inquiries are in the making. There is some promise that the Santa Fe will come into the market for equipment, and there is a general belief that once a move of this kind gets under way other railroads will fall in line. The Illinois Central is making slight changes in its specifications for 2300 cars, indicating that this inquiry is not out of the market.

Use of steel in railroad shops seems destined to increase. Some railroads are announcing car building schedules in their own shops, and others, among them the Chicago & Alton and the St. Louis-San Francisco, are now building up shop forces.

Sales of finished steel in the week were the best in 12 weeks. The tonnage included rails, but there was a general quickening in demand for other commodities that are used by well diversified industries. The character of business is such that orders come frequently and for small lots to be entered at mills for early rolling. The effect of this has been to raise ingot output to 57 per cent of capacity, which reclaims ground lost over the past two weeks.

Cast Iron Pipe

Public buying of cast iron pipe continues to taper, but increased activity on the part of industrials is tending to offset this situation. In fact, the industrials started a week or 10 days ago to make known some wants, and these have expanded, with the result that orders from this source, plus the needs of other private buyers, compare favorably with the best period experienced so far this year. It is also noted that contractors have been getting more business and some of their orders to pipe foundries are for rush shipments for laying before winter weather. The Northwest has already experienced a blizzard and much of the Northern part of the country has felt the first sting of cold weather. This situation is already being felt at foundries, which find that specifications against old commitments are lighter when the pipe is to be delivered in northerly sections. The United States Pipe & Foundry Co. has taken 5000 ft. of 6-in. pipe for Canton, Ohio.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, \$44 to \$45; 4-in., \$47 to \$48; Class A and gas pipe, \$3 extra.

Western steel market shows slight improvement, with ingot operations up to 57 per cent from 55 per cent a week ago.

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Orders for rails and track supplies total 50,000 tons. Some equipment buying now in prospect.

* * *

Farm implement industry expected to swing into larger production by Nov. 1.

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Sales of finished steel, including rails, the best in 12 weeks.

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Scrap market presents different picture, however, being markedly weak.

Pig Iron

Changes in this market are coming very slowly. Shipments of Northern foundry iron during the week have been at about the rate of the previous week, and to date October deliveries are ahead of shipments in the first three weeks of September. New buying is confined to spot purchases. Inquiries for delivery after the first of the year are less numerous and many of them do not materialize into sales. Prices are steady at \$17.50 a ton, base, local furnace. Interest in Southern iron is low. Sales of charcoal iron have been light throughout the month. The silvery market is dormant.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25	\$17.50
N'th'n No. 1 fdy., sil. 2.25 to 2.75	18.00
Malleable, not over 2.25 sil.	17.50
High phosphorus	17.50
Lake Super. charcoal, sil. 1.50	27.04
S'th'n No. 2 fdy.	17.51
Low phos., sil. 1 to 2 cop-per free	\$28.50 to 29.20
Silvery, sil. 8 per cent	26.79
Bess. ferrosilicon, 14-15 per cent	46.29

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Rails and Track Supplies

The Union Pacific has ordered 45,000 tons of rails, and miscellaneous purchases of track supplies aggregate 4000 tons. The rails were distributed as follows: 19,800 tons to the Colorado Fuel & Iron Co.; 19,800 tons to Illinois Steel Co., and 5400 tons to Inland Steel Co. It is reported here that the Chesapeake & Ohio has placed part of its track accessory needs and that a fair tonnage is still pending. The Erie Railroad is said to be preparing to

enter the market for 40,000 tons of rails and the Northern Pacific will extend a seven-mile spur between Pablo and Polson, Mont. The Chicago & North Western is expected to order 30,000 tons of rails this week. Prices for tie plates remain unsteady, with prices ranging from \$39 to \$40 a ton.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess. rails, \$43; light rails, rolled from billets, \$36. Per lb.: Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.07½c. to 2.15c.; angle bars, 2.75c.

Cold Rolled Strip

New business and specifications are a shade heavier than a week ago, with little effect, however, on operations. Prices are steady at 2.35c. a lb., Cleveland, or 2.63c. a lb., delivered Chicago.

Wire Products

Jobbers of wire products are again rounding out rather depleted stocks and as a result orders from this source are larger from several important sections of the country. There is also noted an increase in demand from the manufacturing trade. Automobile builders are inclined to take more wire, and bolt manufacturers are following a slight upturn in their business by specifying somewhat larger tonnages. The same situation prevails among producers of farm machinery. On the whole, this market appears to have regained some of the ground lost a week ago.

Sheets

Buyers' needs are gradually expanding, as shown by order mails in the last week. Demand is widespread and covers a full range of commodities, thereby leading to the impression that not alone are stocks low, but that consumption is gaining ground. Mill backlogs are light and purchases are in general for delivery at the earliest convenience of sellers. This favorable turn in the tonnage side of the situation is reflected in a stronger price structure. Mill prices for No. 10 blue annealed sheets are holding at 2.10c. a lb. When variations occur they are usually on narrow widths which can be rolled on continuous mills. The 3.10c. a lb. price for galvanized sheets is more common than a week ago, and the market on this grade is quotable at 3.10c. to 3.20c. The Milwaukee hot mills are still out of service, but other units are operating with better schedules, as is evidenced by a gain in operations to a range of 55 to 60 per cent of capacity.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.60c.; No. 24 galv., 3.15c. to 3.25c.; No. 10 blue ann'd, 2.15c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Plates

Evidence is gathering that several Western railroads are contemplating entering the equipment market. The Illinois Central, which earlier in the year put out inquiries for 2300 cars, has called in the old specifications and it is said will soon issue new ones. In the meantime, mills have taken orders for 6000 tons of steel for the 500 cars recently ordered by the Chicago Great Western. Contrary to appearances several weeks ago, the large storage tank business is gaining headway. Two oil producers in the Southwest have this week placed orders for an aggregate of 3000 tons, and new inquiries of interesting size are taking shape. Reports as to railroad shop operations are mixed. A large Eastern railroad is reported to be laying men off, while in the West the Chicago & Alton is planning to add 600 men to its payrolls and the Milwaukee road is adding slowly to its forces.

Structural Material

This market remains quiet, highway bridge lettings in Illinois and neighboring States being the most active source of tonnage at this time. Of special interest in Chicago is the announcement that a site has finally been chosen for the new Post Office and that work will probably get under way soon after the first of the year.

Bars

Specifications for mild steel bars show further slight gains this week. Use is well diversified as to types of industries, and the character of orders reflects light stocks in the hands of consumers. A farm equipment manufacturer has placed a large order for forgings for tractors that are to be shipped to Russia. Otherwise this industry is quiet, though rather confident that it will start winter manufacturing operations in the early part of November.

Demand for alloy bars is steady, though it still does not afford output of more than 50 per cent of mill capacity. The iron bar market is very quiet. Specifications for rail steel bars from farm equipment and farm machinery manufacturers are steady, but in small aggregate tonnage. With the fence post season at an end, sellers find fall shipments this year compare very favorably with deliveries in the corresponding period a year ago.

Bolts, Nuts and Rivets

Specifications for these commodities are enough heavier to hold the average rate of shipments so far in October above the rate last month. The trade is still waiting for larger orders from the farm implement group, which is looking forward to Nov. 1 as about the date when winter manufacture for spring delivery will get under way.

Reinforcing Bars

Contractors, pressing against time to complete present undertakings be-

fore winter weather, are ordering reinforcing bars in larger lots. This situation, plus a gain in the number of small orders being placed, is resulting in somewhat larger bending shop operations. A new building code, soon to be put in effect in Chicago, is evidently retarding progress on some projects. The Eddystone apartments, requiring about 700 tons, is one of these, it now being necessary to revise the plans to suit the new requirements. Road contractors have ordered 200 tons of bars, and a Chicago school accounts for 230 tons in new business. An apartment building at Seventieth Street and Lake Shore Drive will make use of 600 tons. Prices remain variable except for rail steel bars for road and bridge work, on which quotations are 1.65c. and 1.75c. a lb., respectively.

Old Material

Supplies of most grades of scrap iron and steel continue to expand, and price weakness is accentuated by dealers' pressure for sales. Heavy melting steel was sold in the week at \$12 a gross ton, delivered, but with tonnages piling on tracks sellers are prepared to offer this grade at \$11.50 a ton. Hydraulic bundles, which recently were sold at \$10.25, are undergoing the same pressure and offerings are free at \$9.75. A large sale of 2-ft. rails has brought out a new low price of \$14. Examples given above are typical of practically every grade where sales are made or when available tonnages are offered. Among lists published by the railroads are 3000 tons by the Rock Island, 5000 tons, including 1500 tons of heavy melting steel, by the Santa Fe and 3000 tons by the Burlington. None of these lists compare in size with those usually offered at this time of year, but when bids have

been accepted the railroads are unusually prompt in getting the material on track. At the same time dealers who had accumulated tonnages as a speculative measure continue to liquidate, and the manufacturing industries, as producers of scrap, are less inclined to accumulate tonnages in anticipation of a higher market. Practically every market factor is at work to force the issue into the hands of consumers, who seem as yet hesitant to buy far into the future. Shipments to mills are steady, but at a very low rate.

Prices deliv'd Chicago district consumers:

Per Gross Ton

Basic Open-Hearth Grades:	
Heavy melting steel.....	\$11.00 to \$11.50
Shoveling steel	11.00 to 11.50
Frogs, switches and guards, cut apart, and misc. rails	12.00 to 12.50
Hydraul. compressed sheets	9.25 to 9.75
Drop forge flashings.....	7.75 to 8.25
No. 1 busheling	9.00 to 9.50
Forg'd cast and r'l'd steel carwheels	14.75 to 15.25
Railroad tires, charg. box size	15.50 to 16.00
Railroad leaf springs cut apart	15.00 to 15.50
Acid Open-Hearth Grades:	
Steel couplers and knuckles	13.00 to 13.50
Coil springs	15.50 to 16.00
Electric Furnace Grades:	
Axle turnings	10.75 to 11.25
Low phos. punchings.....	12.50 to 13.00
Low phos. plates, 12 in. and under	12.50 to 13.00
Blast Furnace Grades:	
Axle turnings	8.00 to 8.50
Cast iron borings.....	5.50 to 6.00
Short shoveling turnings..	5.00 to 5.50
Machine shop turnings....	5.25 to 5.75
Rolling Mill Grades:	
Iron rails	12.00 to 12.50
Rerolling rails	13.50 to 14.00
Cupola Grades:	
Steel rails, less than 3 ft..	13.25 to 13.75
Steel rails, less than 2 ft..	13.50 to 14.00
Angle bars, steel.....	12.00 to 12.50
Cast iron carwheels.....	13.00 to 13.50
Malleable Grades:	
Railroad	13.00 to 13.50
Agricultural	11.75 to 12.00
Miscellaneous:	
*Relaying rails, 56 to 60 lb.	23.00 to 25.00
*Relaying rails, 65 lb. and heavier	26.00 to 31.00

Per Net Ton

Rolling Mill Grades:	
Iron angle and splice bars.	12.00 to 12.50
Iron arch bars, and transoms	12.00 to 12.50
Iron car axles	21.50 to 22.00
Steel car axles	14.50 to 15.00
No. 1 railroad wrought...	9.25 to 9.75
No. 2 railroad wrought...	9.75 to 10.25
No. 1 busheling	7.50 to 8.00
No. 2 busheling	6.00 to 6.50
Locomotive tires, smooth..	13.00 to 13.50
Pipes and flues.....	7.00 to 7.50
Cupola Grades:	
No. 1 machinery cast.....	10.50 to 11.00
No. 1 railroad cast.....	9.50 to 10.00
No. 1 agricultural cast....	9.00 to 9.50
Stove plate	8.00 to 8.50
Grate bars	8.00 to 8.50
Brake shoes	8.00 to 8.50

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

To Consider Scrapping 2,000,000 Automobiles

At a meeting of the National Advisory Council of the Institute of Scrap Iron and Steel, Inc., to be held at the Cleveland Hotel, Cleveland, on Oct. 29 and 30, the problem of scrapping more than 2,000,000 old automobiles on a national scale will be considered.

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes.....	3.00c.
Soft steel bars	2.90c.
Reinforc'g bars, billet steel—	
Less than 5 tons	2.85c.
5 tons to 30 tons	2.45c.
30 tons to 200 tons.....	2.00c.
200 tons and over.....	1.75c.
Rail steel reinforcement—	
Less than 5 tons.....	2.50c.
5 tons to 30 tons.....	2.10c.
30 tons and over.....	1.50c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	3.35c.
Flats and squares.....	3.85c.
Bands (½ in. in Nos. 10 and 12 gages)	3.10c.
Hoops (No. 14 gage and lighter)..	3.65c.
Black sheets (No. 24).....	3.80c.
Galv. sheets (No. 24).....	4.35c.
Blue ann'd sheets (No. 10).....	3.35c.
Spikes (½ in. and larger).....	3.55c.
Track bolts	4.55c.
Rivets, structural	4.00c.
Rivets, boiler	4.00c.
Per Cent Off List	
Machine bolts	60 and 10
Carriage bolts	60 and 10
Coach or lag screws.....	60 and 10
Hot-pressed nuts, sq., tap, or blank,	60 and 10
Hot-pressed nuts, hex., tap., or blank,	60 and 10
No. 8 black ann'd wire, per 100 lb.	\$3.45
Com. wire nails, base per keg.	\$2.30 to 2.55
Cement c't'd nails, base per keg	2.30 to 2.55

CLEVELAND

Steel Demand Tapering Off in Some Lines— Ingot Output Lower

CLEVELAND, Oct. 21.—The steel market is drifting along with little indication of a better demand in the near future. The volume so far this month shows little change as compared with September. Heavier rolled steel products are moving at about the same rate as last month, but business in sheets and strip steel has tapered off the past two weeks.

Another open-hearth furnace in Cleveland has been shut down, local plants now operating at 35 per cent of ingot capacity, compared with 50 per cent at the first of the month. One local blast furnace was blown out, leaving three of seven independent furnaces in operation in Cleveland. Some of the Ohio sheet mills were shut down this week.

Metal-working plants in this territory are maintaining recent operations, those in the automotive field as a rule not doing so well as in other industries. Consumers generally are not getting enough orders to accumulate much of a backlog. Aside from recent buying of steel bars and sheets for the new line of Chevrolet cars, very little business is coming from the motor car industry and little if any pick-up is expected in this field during the remainder of the year. Hand-to-mouth buying is the policy of most consumers.

While no price changes were made during the week, prices became firmer on plates and shapes and concessions appeared on auto body sheets. Other grades of sheets remain irregular. As usual, Detroit appears to be the weak spot of the sheet market.

Strip Steel

Few orders for hot-rolled strip came out during the week and these were for small lots. Demand is of a hand-to-mouth character from all consuming industries. The market appears to be holding to 1.60c., Pittsburgh, for wide strip and 1.70c. for narrow, with some small orders going at \$1 a ton higher. Cold-rolled strip continues inactive, with 2.35c., Cleveland, the ruling price, although some effort is still being made to get 2.45c. for small lots.

Pig Iron

Sales were light the past week and not much new inquiry came out. Inquiries from a Muncie, Ind., foundry for 3000 tons of malleable and from the Westinghouse Electric & Mfg. Co. for its requirements for its Cleveland plant are still pending. Many foundries are buying only for immediate needs. Shipments continue rather light, showing no improvement over last month. The Corrigan, McKinney Steel Co. has blown out a furnace, now operating two of four.

While the market lacks strength,

prices appear to be holding closely to recent levels. Lake furnaces quote foundry and malleable grades at \$16.50 to \$17 for delivery in Ohio and Indiana, although the lower price has been sharply shaded for shipment to competitive points. For Cleveland delivery, the local furnace price is \$17.50. In Michigan, the price is unchanged at \$18.

Prices per gross ton at Cleveland:	
N'th'n fdy., sil. 1.75 to 2.25.	\$17.50
S'th'n fdy., sil. 1.75 to 2.25.	\$17.51 to 18.01
Malleable	17.50
Ohio silvery, 3 per cent.	25.00
Stand. low phos., Valley...	27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 50c. average local switching charge; \$3 from Jackson, Ohio; \$6.01 from Birmingham.

Sheets

Light orders from all sources during the past week indicated a continuance of a downward tendency in the demand. Buying by the automotive and other industries is only for immediate needs. Concessions of \$2 a ton to 3.40c., Pittsburgh, are reported on auto body sheets, although the lower price does not seem to have appeared in this territory. Irregularities are still reported on blue annealed sheets and, while jobbing mills quote light plates at 1.90c. to 2c. and blue annealed sheets at 2.05c. to 2.15c., they do not appear to be holding closely to these ranges. Sales of continuous mill sheets are reported in the Detroit territory at 1.80c. for light plates and 1.90c. for blue annealed sheets. On black sheets 2.35c. has become more common.

Bars, Plates and Shapes

Specifications for steel bars are barely holding up to recent volume, which is due largely to the slow operation of the motor car industry. Some of the local shops making automobile forgings are operating at 25 per cent of capacity. Business in reinforcing bars is slow. The Cleveland Stadium, for which bids have been taken, will require 460 tons. Plates are quiet. Demand for shapes is holding to recent volume. A railroad bridge for

Cincinnati, requiring 790 tons, was placed through Cleveland offices, and a 2000-ton steel plant addition at Ecorse, Mich., was also awarded. New inquiry includes a Cleveland school, requiring 800 tons. While there is little local inquiry for fabricated work, reports indicate a gain in the amount of work in prospect.

The plate and shape market has a firmer tone, and the 1.60c. price evidently is now adhered to. Steel bars are maintained at 1.60c., Cleveland, for outside shipment and at 1.65c. for local delivery.

Old Material

With shipments restricted and no new buying, Cleveland dealers are finding a weaker market in the Youngstown district, where No. 1 heavy melting steel is being offered to consumers at \$14. Locally, the market is very dull. Shipments to one plant of a Cleveland consumer were suspended this week. Prices remain about at recent levels. With no local demand for compressed sheet steel, dealers are finding some outlet in the Youngstown district, where this grade is bringing \$13.50.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel...	\$11.25 to \$11.75
No. 2 heavy melting steel...	10.75 to 11.25
Compressed sheet steel...	11.25 to 11.75
Light bundled sheet	
stampings	9.00 to 9.25
Drop forge flashings	10.00 to 10.50
Machine shop turnings	6.50 to 7.00
Short shoveling turnings	8.00 to 8.50
No. 1 railroad wrought...	13.00 to 13.50
No. 2 railroad wrought...	14.00 to 14.50
No. 1 busheling	11.00 to 11.50
Pipes and flues	9.00 to 9.50
Steel axle turnings	12.50 to 13.00
Acid Open-Hearth Grades:	
Low phos., billet bloom and slab crops	17.50 to 18.00
Blast Furnace Grades:	
Cast iron borings	7.50 to 8.00
Mixed borings and short turnings	7.50 to 8.00
No. 2 busheling	7.00 to 7.50
Cupola Grades:	
No. 1 cast	13.00 to 13.50
Railroad grate bars	10.00 to 10.50
Stove plate	10.50 to 11.00
Rails under 3 ft.	16.00 to 16.50
Miscellaneous:	
Rails for rolling	16.25 to 16.50
Railroad malleable	15.00 to 15.50

Scrap Lower at Detroit

DETROIT, Oct. 21.—Price declines on old material have occurred in this district, with virtually the entire list registering 25c. to 50c. a ton drops.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov.	
steel	\$10.50 to \$11.00
Borings and short turnings	4.50 to 5.00
Long turnings	4.00 to 4.50
No. 1 machinery cast	10.50 to 11.00
Automotive cast	12.00 to 12.50
Hydraul. comp. sheets	10.50 to 11.00
Stove plate	7.50 to 8.00
New No. 1 busheling	9.00 to 9.75
Old No. 2 busheling	4.75 to 5.25
Sheet clippings	7.50 to 8.00
Flashings	9.25 to 9.75

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and struc. shapes	2.95c.
Soft steel bars	2.85c.
Reinforc. steel bars	2.25c. to 2.50c.
Cold-fin. rounds and hex.	3.40c.
Cold-fin. flats and sq.	3.90c.
Hoops and bands, No. 12 to 14 in., inclusive	3.10c.
Hoops and bands, No. 13 and lighter	3.65c.
Cold-finished strip	5.95c.
Black sheets (No. 24)	3.60c.
Galvanized sheets (No. 24)	4.35c.
Blue ann'd sheets (No. 10)	3.10c.
No. 9 ann'd wire, per 100 lb.	\$2.50
No. 9 galv. wire, per 100 lb.	2.95
Com. wire nails, base per keg	2.40

*Net base, including boxing and cutting to length.

NEW YORK

Sheet Prices Show Fresh Weakness—Pig Iron Sales Decline

NEW YORK, Oct. 21.—Pig iron sales have declined, amounting to 7000 tons, compared with 8500 tons in the preceding week and 9000 tons two weeks ago. The Worthington Pump & Machinery Corp'n. has closed for 550 tons for Harrison, N. J., 250 tons for Buffalo and 200 tons for Holyoke, Mass. Few sizable inquiries are in the market, but several sellers report that pig iron shipments have improved appreciably in the past fortnight.

The barge movement from Buffalo is showing a final bulge as the navigation season draws to an end. The last barges will leave Buffalo about Nov. 1. It seems very doubtful whether any Alabama iron was shipped by barge to the Buffalo district. There would be virtually no advantage in transportation cost over shipping all-rail.

Prices are unchanged, with Buffalo foundry iron available at \$15.50, base furnace, and Alabama iron at \$11 to \$11.50, base Birmingham.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25.....	\$20.41 to \$20.91
*Buff. No. 2, del'd east. N. J.	18.78 to 19.28
East. Pa. No. 2 fdy., sil. 1.75 to 2.25.....	18.89 to 19.39
East. Pa. No. 2X fdy., sil. 2.25 to 2.75.....	18.89 to 19.89

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of \$3.28 a ton from Buffalo.

Finished Steel

Further weakness in sheet prices is the principal development. Competition has broken out in continuous mill sheets, with sales at 1.75c., Pittsburgh, for No. 10 gage and at 1.90c. for No. 13 gage, prices in both instances being \$1 a ton under the recognized schedule. Galvanized sheets are also weak, having declined to 2.95c., Pittsburgh, on a few of the more important sales. Most mills have been trying to maintain a 3c. level. On black sheets, 2.35c. is more common, though it is still restricted by most sellers to the larger buyers. The bulk of the trade, however, is paying no more than 2.40c. Jobbing mill blue annealed sheets are quoted at 1.90c. for No. 10 gage and 2.05c. for No. 13. Plate, shape and bar prices are steady at current quotations, which are 1.70c., Coatesville, Pa., for plates, 1.70c., Bethlehem, Pa., for shapes and 1.60c., Pittsburgh, for bars. Higher prices are rarely obtained, and on plates and shapes there are occasional concessions on desirable tonnage. Hot-rolled strip steel is being sold at 1.60c. for the wide material in carload lots and at 1.70c. for narrow. On less than carloads a \$1 advance is sometimes charged.

Local steel sales offices report no

gain in orders. A few tin plate contracts for the first half of 1931 have been made at the new price of \$5 a base box, Pittsburgh.

The Erie Railroad will issue an inquiry within a few days for about 40,000 tons of rails. The New York Central inquiry, which has been expected for some weeks, may come out this week. The amount probably will be 175,000 tons. The Atlantic Coast Line has ordered 16,000 tons of rails, equally divided between the Carnegie Steel Co. and the Bethlehem Steel Co.

Warehouse Business

Orders continue decidedly small with most jobbers, but they are fairly numerous, so that October is expected to compare favorably with September in the total of business. Shading of several dollars a ton on black, galvanized and blue annealed sheets continues.

Cast Iron Pipe

Demand for pressure pipe continues to be limited to lots of less than 100 tons. Rahway, N. J., is inquiring for about 85 tons of pipe and fittings, Hartford, Conn., for about 70 tons, and Pleasantville, N. Y., for a carload. Current inquiries for export aggregate more than 7000 tons of pipe. Despite the lack of any substantial buying prices show stability, ranging on recent purchases from \$36 to \$37 a net ton, f.o.b. Northern foundry.

Prices per net ton deliv'd New York: Water pipe, 6-in. and larger, \$38.90 to \$39.90; 4-in. and 5-in., \$41.90 to \$42.90; 3-in., \$48.90 to \$49.90. Class A and gas pipe, \$3 extra.

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes.....	3.10c.
Soft steel bars, small shapes.....	3.10c.
Iron bars.....	3.24c.
Iron bars, Swed. charcoal.....	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons.....	3.40c.
Flats and squares.....	3.90c.
Cold-roll. strip, soft and quarter hard.....	4.95c.
Hoops.....	3.75c.
Bands.....	3.40c.
Blue ann'd sheets (No. 10).....	3.25c. to 3.40c.
Black sheets (No. 24*).....	3.65c. to 3.75c.
Galvanized sheets (No. 24*).....	4.25c.
Long terme sheets (No. 24).....	5.80c.
Standard tool steel.....	12.00c.
Wire, black annealed.....	4.50c.
Wire, galv. annealed.....	5.15c.
Tire steel, ½ x ½ in. and larger.....	3.40c.
Smooth finish, 1 to 2½ x ¼ in. and larger.....	3.75c.
Open-hearth spring steel, bases.....	4.50c. to 7.00c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

	Per Cent Off List
Machine bolts, cut thread:	
¾ x 6 in. and smaller.....	.65
1 x 30 in. and smaller.....	.65
Carriage bolts, cut thread:	
¾ x 6 in. and smaller.....	.65
¾ x 20 in. and smaller.....	.65
Boiler Tubes:	Per 100 Ft.
Lap welded, 2-in.....	\$19.00
Seamless steel, 2-in.....	20.25
Charcoal iron, 2-in.....	26.25
Charcoal iron, 4-in.....	67.00

Reinforcing Bars

Three local public projects were brought closer to maturity last week when general contracts were taken on the foundations for the Riker's Island penitentiary, requiring 900 tons, and two subway sections, calling for a total of 1600 tons. Lettings are in fair volume, with small lots moving better than larger tonnages.

For mill shipment, distributors of concrete bars quote 1.70c. a lb., Pittsburgh, on building and paving work, and 1.80c. on subway work (rail steel offered at \$4 a ton less); for delivery from local stock, 2.35c. a lb., New York, up to 3.05c. a lb. for lots of less than 2 tons.

Coke

Foundry coke specifications have not duplicated the gain reported in pig iron shipments. Demand for heating coke has not yet felt the stimulus of colder weather. Furnace coke prices range from \$2.50 to \$2.60 a net ton, Connellsville, while foundry coke quotations follow:

Special brands of beehive foundry coke, \$4.70 to \$4.85 a net ton, ovens, or \$8.41 to \$8.56 delivered to northern New Jersey, Jersey City and Newark, and \$9.29 to \$9.44 to New York and Brooklyn; by-product foundry coke, \$9 to \$9.40, Newark or Jersey City; \$10.06, New York or Brooklyn.

Old Material

Brokers are no longer buying No. 1 heavy melting steel for barge shipment to Buffalo consumers, but small contracts for this grade are being filled for barge shipment to a Bridgeport, Conn., user, for which \$9 a ton, New York, is being paid. Brokers buying heavy melting steel for eastern Pennsylvania delivery are offering \$12, delivered, or \$8.50, New York. Other grades of scrap continue quiet.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel..	\$8.50 to \$9.00
Heavy melting steel (yard)	5.75 to 6.25
No. 1 hvy. breakable cast..	8.00 to 8.50
Stove plate (steel works)...	6.00 to 6.25
Locomotive grate bars....	6.00 to 6.50
Machine shop turnings....	5.00 to 5.25
Short shoveling turnings..	5.00 to 5.50
Cast borings (blast fur. or steel works).....	4.50 to 4.75
Mixed borings and turnings.....	4.50 to 5.00
Steel car axles.....	17.00
Iron car axles.....	19.00 to 19.50
Iron and steel pipe (1 in. dia., not under 2 ft. long)	7.50 to 8.00
Forge fire.....	7.00 to 7.50
No. 1 railroad wrought....	9.75
No. 1 yard wrought, long..	8.75
Rails for rolling.....	9.50 to 10.00
Stove plate (foundry)....	7.00
Malleable cast (railroad)...	10.50 to 11.00
Cast borings (chemical)...	8.50 to 9.00

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast.....	\$14.00
No. 1 hvy. cast (columns, bldg. materials, etc.): cupola size.....	12.00
No. 2 cast (radiators, cast boilers, etc.)	11.50

Republic Steel Corp'n. has received an order from the Biggs Boiler Works Co., Akron, Ohio, for Toncan iron to provide one mile of water pipe for Detroit.

PHILADELPHIA

Mill Operations Lower — Sheet Prices Lack Strength

PHILADELPHIA, Oct. 21.—Steel mill operations are in certain instances at less than 50 per cent of capacity, so that output in eastern Pennsylvania is from 45 to 50 per cent, except in the case of the leading independent, which is operating at a slightly higher rate. While steel bar prices are being maintained steadily at 1.60c. a lb., Pittsburgh, plate and shape quotations are subject to occasional concessions of \$1 a ton on desirable business. Sheet prices show continued softness, black sheets having settled to 2.35c., Pittsburgh, galvanized having been quoted to preferred buyers at 2.90c., Pittsburgh, and blue annealed, No. 13 gage ranging from 2.05c. to 2.15c., Pittsburgh.

Following a period of moderate activity in pig iron, the market has become decidedly quiet. Recent purchases of scrap by consumers have been at lower than the previous prices, but the only substantial tonnages have been in heavy melting steel.

Pig Iron

Southern foundry iron is still offered to eastern Pennsylvania consumers at \$11.50 a ton, furnace, but demand for pig iron is smaller than in some weeks, and sales of both Southern and eastern Pennsylvania iron are small. Buffalo sellers have been supplying a substantial tonnage of malleable iron to eastern Pennsylvania users at about \$21 a ton, delivered. No transactions are reported in basic iron, but a Southern producer is understood to have offered to contract for a substantial tonnage at \$10, Birmingham furnace. Eastern Pennsylvania users, however, are not especially interested in using the analysis available from the South.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	\$18.76 to \$19.26
East. Pa. No. 2X, 2.25 to 2.75	19.26 to 19.76
East. Pa. No. 1X	19.76 to 20.26
Basic (del'd east. Pa.)	17.75 to 18.25
Malleable	21.00
Stand. low phos. (f.o.b. east. Pa. furnace)	24.00
Cop. b'r'g low phos. (f.o.b. furnace)	23.00 to 24.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.29
Va. No. 2X, 2.25 to 2.75 sil.	22.79

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

Plates

Few contracts of size are in the market, and mills are operating at 50 per cent and in certain cases at 45 per cent of capacity. The Newport News Shipbuilding & Dry Dock Co. has received the award of an airplane carrier for the Navy, which will require close to 10,000 tons of steel. Plate prices are 1.70c. a lb., Coatesville, Pa., for ordinary specifications,

with \$1 a ton concessions occasionally granted on desirable business.

Shapes

The larger fabricators are fairly well engaged, but some of the smaller shops are greatly in need of business. Included in the larger projects for steel in this district is the new Locust Street subway, requiring about 7000 tons. The quotation on shapes is unchanged at 1.70c. a lb., f.o.b. nearest mill to consumer, or 1.76c., delivered Philadelphia, with concessions of \$1 a ton to 1.65c., mill, on the more sizable orders.

Steel Bars

Buying is limited to small lots, and the price of merchant bars is unchanged at 1.60c. a lb., Pittsburgh, or 1.89c., delivered Philadelphia. Reinforcing bars are quoted at 1.75c., Pittsburgh, or 2.04c., delivered Philadelphia, for billet steel and at 1.55c., Franklin, Pa., or 1.84c., delivered Philadelphia, for rail steel bars.

Warehouse Business

Plates, shapes, bars, sheets and hoops and bands have been revised downward \$2 a ton by jobbers in this district. The volume of business shows no improvement over that of September, which was a rather poor month.

Sheets

Radio manufacturers are steadily increasing their output, so that present production of the three leading makers in this district is about 15,500 sets a day, of which one company is making 7500 sets, another 6000 and a third about 2000 sets. Other consumers of sheets, however, are only operating on limited production programs and sheet prices are being shaded. Black sheets have settled to 2.35c. a lb., Pittsburgh, or 2.64c., delivered Philadelphia. Galvanized sheets, although quoted at 3c., Pittsburgh, or 3.29c., Philadelphia, are

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.50c.
Structural shapes	2.50c.
Soft steel bars, small shapes, iron bars (except bands)	2.60c.
Reinforc. steel bars, sq. twisted and deform.	2.50c. to 2.60c.
Cold-fin. steel, rounds and hex.	3.30c.
Cold-fin. steel, sq. and flats.	3.70c.
Steel hoops	3.15c.
Steel bands, No. 12 to ¾-in. incl.	2.90c.
Spring steel	5.00c.
*Black sheets (No. 24)	3.60c.
†Galvanized sheets (No. 24)	4.15c.
Light flats, blue annealed (No. 10)	3.05c.
Blue ann'd sheets (No. 13)	3.20c.
Blue ann'd floor plates, ¼-in.	5.20c.
Diam. pat. floor plates, ¼-in.	6.00c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

subject to \$2 a ton concessions to preferred buyers, or 2.90c., Pittsburgh. Blue annealed sheets, No. 13 gage, range from 2.05c. to 2.15c., Pittsburgh, or 2.34c. to 2.44c., delivered Philadelphia, and blue annealed plates, No. 10 gage, are 1.90c. to 2c., Pittsburgh, or 2.19c. to 2.29c., Philadelphia.

Imports

In the week ended Oct. 18, 1980 tons of pig iron arrived at this port, of which 1620 tons was received from the United Kingdom, 325 tons from British India and 35 tons from Sweden. Ore arrivals consisted of 6700 tons of iron ore from Spain, and 2622 tons of chrome ore from Cuba.

Old Material

A Coatesville, Pa., steel mill has closed on 15,000 tons of No. 1 heavy melting steel at \$12.50 a ton, delivered, which follows the purchase a week ago of about 2000 tons of the same grade by an Eddystone, Pa., user at \$12.50, delivered. Machine shop turnings lack strength, and the most recent purchase by an eastern Pennsylvania consumer was at \$8 a ton, delivered, the turnings coming from local supplies. A Florence, N. J., consumer of heavy breakable cast, which until recently was offering \$12 a ton, delivered, has been unwilling to buy at \$11.50, delivered.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	\$12.50
No. 2 heavy melting steel	\$10.50 to 11.00
Heavy melting steel (yard)	10.00
No. 1 railroad wrought	14.75 to 15.00
Bundled sheets (for steel works)	9.50
Hydraulic compressed, new	11.00 to 11.50
Hydraulic compressed, old	9.00 to 9.50
Machine shop turnings (for steel works)	8.00 to 9.00
Heavy axle turnings (or equiv.)	11.50 to 12.00
Cast borings (for steel works and roll. mill)	8.50 to 8.75
Heavy breakable cast (for steel works)	11.50
Railroad grate bars	10.00
Stove plate (for steel works)	10.00
No. 1 low phos., hvy., 0.04% and under	20.00
Couplers and knuckles	17.50 to 18.00
Rolled steel wheels	17.50 to 18.00
No. 1 blast f'nace scrap	8.00 to 8.50
Wrot. iron and soft steel pipes and tubes (new specific.)	12.00 to 12.50
Shafting	18.00 to 18.50
Steel axles	20.50 to 21.00
No. 1 forge fire	11.00 to 11.50
Cast iron carwheels	15.00
No. 1 cast	13.00 to 13.50
Cast borings (for chem. plant)	14.00 to 14.50
Steel rails for rolling	13.50 to 14.00

American Forging & Socket Co. has declared the regular quarterly dividend of 15c. a share on its no par shares.

BOSTON

Pig Iron Demand Small as Melt Is Not Increasing—Scrap Weak

BOSTON, Oct. 21.—The Mystic Iron Works last week sold 1200 tons of pig iron. Total bookings failed to reach 2000 tons. Sales of Virginia, eastern Pennsylvania and imported irons have hardly been a market factor because of low prices made by Buffalo and east of Buffalo furnaces. No new inquiries are in the market, and indications are that few, if any, can be expected during the remainder of 1930 unless there is a radical improvement in the foundry melt. The most important melters are pretty well covered into the first quarter of 1931. A true indication of the foundry melt is found in coke shipments. They have increased little in the past several months and average approximately 35 to 55 per cent under the shipments for the past five years. Prices on Buffalo No. 2X and No. 1X apparently are steady at \$15.50 to \$16 a ton, furnace, but furnaces east of Buffalo will shade the delivered equivalent price when necessity requires.

Foundry iron prices per gross ton deliv'd to most New England points:

†Buffalo, sil. 1.75 to 2.25..	\$19.78 to \$20.28
†Buffalo, sil. 2.25 to 2.75..	19.78 to 20.28
*Buffalo, sil. 1.75 to 2.25..	20.41 to 20.91
*Buffalo, sil. 2.25 to 2.75..	20.91 to 21.41
Va., sil. 1.75 to 2.25..	25.21
Va., sil. 2.25 to 2.75..	25.71
*Ala., sil. 1.75 to 2.25..	21.11
*Ala., sil. 2.25 to 2.75..	21.61
†Ala., sil. 1.75 to 2.25..	17.25
†Ala., sil. 2.25 to 2.75..	17.75

Freight rates: \$4.91 all rail and \$4.28 rail and water from Buffalo; \$5.21 all rail from Virginia; \$9.61 all rail from Alabama and \$5.75 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

Cast Iron Pipe

Cast iron pipe foundries and cement pipe interests lost out on the Worcester, Mass., water project, that city deciding to have 36-in. fabricated

plate pipe. Marblehead, Mass., has appropriated \$75,000 for a water system and is about to close on 745 tons of 16-in. pipe. Franklin, Mass., will shortly take action on a \$30,000 to \$60,000 water main extension program. Current bookings are mostly in car lots, with 6-in. and larger pipe usually selling at \$36 a ton, on cars foundry. A \$3 differential is asked on Class A and gas pipe.

Reinforcing Steel

Only one fair-sized tonnage of billet steel bars was let the past week, 135 tons for a Waltham, Mass., hospital. More than 1000 tons in assorted amounts is still hanging fire. Prices are unsettled, which is one reason pending tonnages have not been closed. From stock they are: 1 to 5-ton lots, 3c. a lb., base; 6 to 99-ton lots, 2.50c. to 2.55c.; 100-ton lots and larger, 2.25c.

Fabricated Structural Steel

One local fabricator the past week figured 20 inquiries, not one of which involved more than 25 tons. This shows the general character of work being done by fabricators today. The General Electric Co.'s new transformer manufacturing plant, involving 1500 tons of steel, at Pittsfield, Mass., is a welding job, consequently the field of bidders is small. A Jamaica Plain, Boston, school, involving about 200 tons, will come up for figuring shortly. Awards of fabricated material the past week just topped 1000 tons in the aggregate.

Finished Steel

During the past month bookings by steel mill representatives have fluctuated each week, but the net result shows little, if any, change in the business curve. Buyers are confining purchases to actual needs for immediate requirements, and have practically no stock on hand. Mills, either directly or indirectly, are bidding on 1500 tons of piling and 115 tons of miscellaneous steel required for a South Portland, Me., Government

lighthouse depot. Low prices are being made to compete with imported piling.

Old Material

The bulk of current buying is confined to axles for New England consumption, and pipe, chemical borings, mixed borings and turnings, forge scrap, steel turnings and steel mill borings for Pennsylvania consumption. Axle and chemical borings prices are holding their own, but those for practically all other materials continue to have a downward tendency. One sale of forge scrap was made the past week at \$6.50 a ton, on cars shipping point, and one at \$5.50, but most business was either at \$6 or \$6.10. Forge flashings were sold in a few instances at \$7, but the bulk of sales, which were in scattered car lots, were at \$6.10 to \$6.60. Steel mill borings in one instance were sold at \$4.10, but in a majority of cases at \$3.60 to \$3.75. It is evident, therefore, that some buyers still have a few old contracts unfilled, and equally evident that new contracts call for a generally lower range of prices. At the moment there is practically no demand for No. 1 heavy melting steel. Scrap rails evidently would be purchased if buyer and seller could agree on price. On Oct. 18 the Boston Elevated Railway closed bids on 500 tons of girder rails, 150 tons of castings and smaller tonnages of miscellaneous scrap. No awards have been made.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel..	\$8.00 to \$8.50
Scrap T rails	8.00 to 8.50
Scrap girder rails	7.00 to 7.50
No. 1 railroad wrought..	8.00 to 8.50
Machine shop turnings...	3.60 to 4.10
Cast iron borings (steel works and rolling mill)	3.60 to 4.10
Bundled skeleton, long...	6.00 to 7.00
Forge flashings	6.10 to 7.00
Blast furnace borings and turnings	3.00 to 3.25
Forge scrap	5.50 to 6.00
Shafting	13.00 to 14.00
Steel car axles	15.00 to 17.00
Wrought pipe, 1 in. in diameter (over 2 ft. long)	7.00 to 7.50
Rails for rolling.....	10.00 to 10.25
Cast iron borings, chemical	9.00 to 9.50

Prices per gross ton deliv'd consumers' yards:

Textile cast	\$11.00 to \$11.50
No. 1 machinery cast.....	12.50 to 13.50
No. 2 machinery cast.....	10.50 to 11.50
Stove plate	8.00
Railroad malleable	14.00 to 14.50

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.365c.
Structural shapes—	
Angles and beams	3.365c.
Tees	3.365c.
Zees	3.365c.
Soft steel bars, small shapes.....	3.265c.
Flats, hot-rolled.....	4.15c.
Reinforcing bars.....	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats.....	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tire steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex.....	3.50c. to 5.55c.
Squares and flats.....	4.00c. to 7.05c.
Toe calk steel	6.00c.
Rivets, structural or boiler.....	4.50c.
Per Cent Off List	
Machine bolts.....	.60 and 5
Carriage bolts .....	.60 and 5
Lag screws .....	.60 and 5
Hot-pressed nuts .....	.60 and 5
Cold-punched nuts .....	.60 and 5
Stove bolts .....	.70 and 10

PACIFIC COAST

SAN FRANCISCO, Oct. 18.—(By Air Mail.)—Movement of iron and steel products on the Pacific Coast during the past 10 days has not been heavy, and new inquiries are slow in coming forth. Uncertainty as regards the future is evidenced in the gradual reduction of stocks both in distributors' and consumers' warehouses. The price structure is holding fairly well.

Outstanding among awards of the week was 3400 tons of structural steel for the new Mills Building, San Fran-

San Francisco Building Award Calls for 3400 Tons of Steel

cisco, placed with McClintic-Marshall Co. The largest pending inquiry involves 10,000 tons of plates for the

Pig iron prices per gross ton at San Francisco:

*Utah basic	\$22.00 to \$24.00
*Utah fdy., sil. 2.75 to 3.25	22.00 to 24.00
**Indian fdy., sil. 2.75 to 3.25	22.00 to 24.00

*Delivered San Francisco.

**Duty paid, f.o.b. cars San Francisco.

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes.....	3.40c.
Soft steel bars.....	3.40c.
Black sheets (No. 24).....	4.35c.
Blue ann'd sheets (No. 10).....	3.80c.
Galv. sheets (No. 24).....	5.00c.
Struc. rivets, 1/2-in. and larger....	5.00c.
Com. wire nails, base per keg....	\$3.35
Cement c'd nails, 100 lb. keg....	3.35

Seattle pipe line, on which the Western Pipe & Steel Co. is low bidder.

Bars

Merchant bars continue to move in small lots. Reinforcing bar awards totaled 750 tons. The largest project called for 300 tons for a warehouse in Los Angeles, booked by an unnamed interest. Several fair-sized new inquiries are in the market and include 600 tons for the Textile Towers in Seattle, 600 tons for the Paramount Theater in Oakland and 350 tons for a building in Berkeley for the University of California. Out-of-stock quotations on reinforcing bars are firm at 2.50c., base, on carload lots.

Plates

Orders for plates involved lots of less than 100 tons. An award is expected within the next few days on

the 10,000-ton Seattle pipe line project. Spokane, Wash., is in the market for an unstated tonnage of steel pipe. Prices range between 2.05c. and 2.15c., c.i.f. coast ports.

Structural Steel

Structural awards aggregated a fair tonnage this week. In addition to the 3400-ton Mills Building, McClintic-Marshall Co. took 325 tons for a new newspaper building in Los Angeles and 100 tons for an apartment building in San Francisco. The Minneapolis-Moline Power Implement Co. booked 100 tons for the John Marshall school, Los Angeles. Bids have been opened on 1200 tons for the Rock Island dam in Washington, and on 300 tons for a highway bridge in Arizona. Prices on shapes are quoted at from 2.15c. to 2.25c., c.i.f.

Cast Iron Pipe

Pending business is confined to two or three projects. No award has been made on 331 tons of 6 to 12-in. Class 150 pipe for Fullerton, Cal., on which the American Cast Iron Pipe Co. is low bidder. Eureka, Cal., will open bids Oct. 21 on 100 tons of 16-in. Class 150 pipe. Los Angeles will open bids Oct. 20 on 2516 tons of 6 to 12-in. Class 150 pipe.

operations to 208 active ovens of 497. This reduces the total of active by-product coke ovens in the district to 912 out of 1390 available.

Old Material

Dealers have maintained present quotations on iron grades despite some pressure to the contrary on the more active items. Demand for steel scrap is still light and the real values at present are uncertain. Improvement is dependent largely on better operations at steel mills.

Prices per gross ton deliv'd Birmingham dist. consumers' yards:

Heavy melting steel.....	\$12.00
Scrap steel ralls.....	\$12.50 to 13.00
Short shovelling turnings....	9.00
Cast iron borings.....	9.00
Stove plate.....	9.50
Steel axles.....	21.00
Iron axles.....	23.00
No. 1 railroad wrought....	10.00 to 10.50
Rails for rolling.....	13.50
No. 1 cast.....	11.50
Tramcar wheels.....	11.50
Cast iron borings, chem....	13.50
Cast iron carwheels.....	12.00

Youngstown

Hubbard No. 1 Furnace Resumes Production

YOUNGSTOWN, Oct. 21.—No. 1 blast furnace in the Hubbard group of the Youngstown Sheet & Tube Co., which has been down several months for repairs and overhauling, has resumed production. Its output is largely used by the Valley Mold & Iron Corp., of Hubbard, maker of steel ingot molds and for the merchant trade. Current output will go in part therefore to meet merchant orders for the last quarter of 1930 and the first quarter of next year.

With this resumption, 11 of 34 blast furnaces in the Youngstown district are in blast, while 26 of 51 independent open-hearth furnaces are active. At its Ohio works, the Carnegie Steel Co. is operating two of six blast furnaces and six or seven of 15 open-hearths from week to week.

Upon completion of repairs now under way, the blast furnace at Lowellville of the Sharon Steel Hoop Co. and the stack at Warren of the Cliffs Corp., supplying hot metal to the Republic Steel Corp.'s Warren open-hearths, will resume. These furnaces will start again in November, according to present expectations.

For the second week, all of the non-integrated rolling mill properties at Middlesboro of the Empire Steel Corp. are idle. The company's main plant at Mansfield has likewise substantially curtailed.

The Sheet & Tube company has suspended its Western Reserve sheet mill works at Warren for an indefinite period. Since last June this plant has been operating on a curtailed basis.

Commercial production of the new electric welding pipe mill of the Sheet & Tube company at the Brier Hill plant has been temporarily deferred, pending the completion of further perfecting in the process.

BIRMINGHAM Pig Iron Melters Buying Only for Actual Needs—Steel Demand Spotty

BIRMINGHAM, Oct. 21.—Larger users of pig iron continue to place contracts occasionally for part, or all, of their fourth quarter requirements, with actual orders on their books as the guiding factor in such purchases. Last week a regular customer of a leading seller ordered 6000 tons of iron to be delivered as required during the fourth quarter. The base price of \$14, Birmingham, holds on district sales. Shipments vary in volume from week to week as foundry melt requirements change, but the aggregate this month so far is only slightly less than the furnace output.

Ten furnaces are in blast, the same as for the past three weeks. Of this number, eight are on foundry iron and two on basic iron.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.....	\$14.00
No. 1 fdy., 2.25 to 2.75 sil.....	14.50
Basic.....	14.00

Finished Steel

Demand is spotty and inquiries fluctuate from week to week. Bookings about held their own last week, but did not show an appreciable gain over those of the preceding week. Sheets and wire products are moving a little better than at the beginning of October. The market for structural shapes shows signs of a little improvement. No new rail orders were reported last week. Some inquiries are coming in on rails and railroad accessories. Only the former mini-

mum price of 1.80c. is now quoted on bars and structural shapes, the range of \$1 having been dropped. Also, the price range of \$1 has been removed from quotations on boxed annealed and galvanized sheets and only the former minimum prices of 2.60c. and 3.15c., respectively, are quoted.

Cast Iron Pipe

New Orleans, La., will open bids Dec. 3 on a good-sized tonnage of 24, 30 and 48-in. pipe. Orange, Va., will open bids Oct. 27 on about three miles of 8 or 10-in. pipe. Between 800 and 900 tons of pipe is to be bought by Marrero, La., on Oct. 30. Clarksville, Tenn., has rejected bids received a short time ago on 350 tons of pipe, and new bids are to be opened this week. Plants in this district are bidding on 525 tons of pipe for Los Angeles. A few cities have inquired on pipe for construction programs outlined for the first half of 1931. Plants are gaging production as closely as possible to current demand and are stocking no more pipe than necessary. Operations this month are reported to be slightly lower than for September. Quotations are without change from the range of \$37 to \$38, base Birmingham, for 6-in. and larger sizes.

Coke

Foundry coke under contract is being moved slowly. New demand is lacking. The Tennessee company has taken off 59 more ovens, reducing its

CANADA

Canadian Pacific to Spend \$17,000,000 for Improvements

TORONTO, Oct. 21.—With most of the melters who place quarterly contracts covered to the end of the year, business in the Canadian pig iron markets has reverted to small spot sales. Producers look for no immediate improvement in the market, although they believe that spot buying will gradually pick up.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75.....	\$22.60
No. 2 fdy., sil. 1.75 to 2.25.....	22.10
Malleable	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75.....	\$24.00
No. 2 fdy., sil. 1.75 to 2.25.....	23.50
Malleable	24.00
Basic	22.50

Rails

Large rail and rolling stock contracts from Canadian railways are expected during November and December, and will have a stimulating effect on the iron and steel industry. It is announced that the Canadian Pacific will spend approximately \$17,000,000 on rail replacements and new branch lines. Prospective rail bookings for this year are estimated at 75,000 tons.

Structural Steel

Contract awards for the week were without special interest. Additional large contracts are said to be pending for the Montreal district. Fabricators have succeeded in closing sufficient business in recent weeks to maintain operations to the end of the year.

Old Material

With the exception of small tonnage spot buying, new business is stagnant. Mills are buying sparingly. Prices are unchanged.

Dealers' buying prices for old material: Per Gross Ton

	Toronto	Montreal
Heavy melting steel.....	\$7.00	\$6.00
Rails, scrap	7.00	6.00
No. 1 wrought	6.00	8.00
Machine shop turnings....	2.00	2.00
Boiler plate	5.00	4.50
Heavy axle turnings.....	2.50	2.50
Cast borings	2.00	2.00
Steel borings	2.00	2.00
Wrought pipe	7.00	9.00
Steel axles	7.00	11.00
Axles, wrought iron.....	10.00	10.00
No. 1 machinery cast.....	8.00	8.00
Stove plate	8.50	8.50
Standard carwheels.....	8.00	8.00
Malleable	8.00	8.00

Per Net Ton

No. 1 mach'y cast.....	11.00	....
Stove plate	9.00	....
Standard carwheels.....	10.00	....
Malleable scrap.....	9.00	....

reinforcing bar demand is exceedingly light.

Old Material

The scrap market has experienced its lightest buying week of the year. Orders are so few that quotations are difficult to establish. The outlook for new business is such that brokers decline to buy any grades for which they have no orders. Country dealers, who have been holding their stocks for some time, seem eager to move them. Declines range from 25c. to 50c. a ton.

Railroad lists: Chicago, Burlington & Quincy, 4465 tons; International Great Northern, 2100 tons; Chicago, Rock Island & Pacific, 54 carloads; Chicago, Milwaukee, St. Paul & Pacific, 49 carloads; Nashville, Chattanooga & St. Louis, 14 carloads; Pullman Co. (St. Louis), six carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

Selected heavy melting steel	
No. 1 heavy melting or shoveling steel	\$11.25 to \$11.75
No. 2 heavy melting or shoveling steel	10.50 to 11.00
No. 1 locomotive tires...	9.50 to 10.00
No. 1 locomotive tires...	12.50 to 13.00
Misc. stand-sec. rails including frogs, switches and guards, cut apart...	11.75 to 12.25
Railroad springs	13.50 to 14.00
Bundled sheets	6.50 to 7.00
No. 2 railroad wrought...	10.50 to 11.00
No. 1 busheling	7.50 to 8.00
Cast iron borings and shoveling turnings.....	5.50 to 6.00
Iron rails	10.00 to 11.00
Rails for rolling	12.75 to 13.25
Machine shop turnings....	4.00 to 4.50
Heavy turnings	8.50 to 9.00
Steel car axles	16.50 to 17.00
Iron car axles	20.50 to 21.00
Wrot. iron bars and trans.	13.50 to 14.00
No. 1 railroad wrought...	8.50 to 9.00
Steel rails, less than 3 ft...	14.00 to 14.50
Steel angle bars.....	11.50 to 12.00
Cast iron carwheels	11.50 to 12.00
No. 1 machinery cast.....	10.50 to 11.00
Railroad malleable	10.50 to 11.00
No. 1 railroad cast	10.25 to 10.75
Stove plate	9.00 to 9.50
Relay. rails, 60 lb. and under	20.50 to 23.50
Relay. rails, 70 lb. and over	26.50 to 29.00
Agricult. malleable	10.00 to 10.50

ST. LOUIS Pig Iron Buying at Low Ebb—Scrap Market Stagnant

ST. LOUIS, Oct. 21.—Melters continue to show indifference as to their future requirements that is most disappointing to makers of pig iron. It had been expected that some sales of consequence would have been made by now, although it was not believed that any great volume would have been disposed of in view of the small amount of business being done by the melters and the carryover tonnage from the preceding quarter. Sales for

the last week amounted only to about 500 tons. Foundry and malleable grades are mostly in demand. Prices are unchanged.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill....	\$17.50
Malleable, f.o.b. Granite City	17.50
N'th'n No. 2 fdy., deliv'd St. Louis	19.66
Southern No. 2 fdy., deliv'd.....	15.92 to 16.42
Northern malleable, deliv'd.....	19.16 to 19.66
Northern basic, deliv'd.....	19.16 to 19.66

Freight rates: 75c. (average) Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

Warehouse Prices, f.o.b. St. Louis

Base per Lb.	
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.15c.
Cold-fin. rounds, shafting, screw stock	3.60c.
Black sheets (No. 24).....	4.25c.
Galv. sheets (No. 24).....	4.60c.
Blue ann'l'd sheets (No. 10).....	3.45c.
Black corrug. sheets (No. 24).....	4.10c.
Galv. corrug. sheets.....	4.70c.
Structural rivets	4.15c.
Boiler rivets	4.15c.

Per Cent Off List

Tank rivets, 7/8-in. and smaller, 100 lb. or more	65
Less than 100 lb.....	60
Machine bolts	60
Carriage bolts	60
Lag screws	60
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50

Finished Steel

The situation as affecting the Granite City Steel Co. is somewhat improved as compared with that of a few weeks ago, though the volume of available business is definitely under normal for this time of year. Buyers are still cautious, purchasing only their immediate requirements, but the company senses a better feeling. Prices, while low, are stable, and no further decline is expected. The demand for galvanized sheets is below normal for this time of year, while other sheet products are moving in satisfactory volume, considering general conditions. Tin plate is moving well, but the demand for tank plates is at a low ebb. Structural steel and

Adirondack Steel Foundries Corp., Watervliet, N. Y., has opened a district sales office in the Park Square Building, Boston. W. W. Weller, New England sales manager, is in charge.

Warehouse Prices, f.o.b. Cincinnati

Base per Lb.	
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.15c.
New billet reinforce. bars.....	3.15c.
Rail steel reinforce. bars.....	3.00c.
Hoops	3.90c.
Bands	3.35c.
Cold-fin. rounds and hex.....	3.80c.
Squares	4.30c.
Black sheets (No. 24).....	4.05c.
Galvanized sheets (No. 24).....	4.90c.
Blue ann'l'd sheets (No. 10).....	3.45c.
Structural rivets	4.20c.
Small rivets	60 per cent off list
No. 9 ann'l'd wire, per 100 lb.....	\$3.00
Com. wire nails, base per keg (25 kegs or more).....	2.95
Cement c't'd nails, base 100 lb. keg	2.95
Chain, per 100 lb.....	10.25
Net per 100 Ft.	
Lap-welded steel boiler tubes, 2-in., 4-in.	\$16.50
Seamless steel boiler tubes, 2-in., 4-in.	34.50
Seamless steel boiler tubes, 2-in., 4-in.	17.50
Seamless steel boiler tubes, 2-in., 4-in.	36.00

CINCINNATI Sheet Demand Slows Down—Continued Dullness in Pig Iron and Scrap

CINCINNATI, Oct. 21.—The pig iron market is quiet and featureless. Consumers confine their purchases to spot orders for immediate needs and show no interest in anticipating their requirements. In the last week sales were about 1700 tons, all of which was in single car lots. District foundries are not running more than a few heats a week, and the active shop is a rarity.

Prices continue to be reasonably steady, with \$11.50, base Birmingham, the bottom figure on Southern iron in this territory. The only inquiry before the trade is from a central Indiana consumer for 500 tons of Southern iron.

Prices per gross ton, deliv'd Cincinnati:
So. Ohio fdy., sil. 1.75 to 2.25 \$20.89 to \$21.39
Ala. fdy., sil. 1.75 to 2.25.. 15.19 to 16.19
Ala. fdy., sil. 2.25 to 2.75.. 15.69 to 16.69
Tenn. fdy., sil. 1.75 to 2.25. 15.19 to 16.19
S'th'n Ohio silvery, 8 per cent 24.39

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

Finished Steel

A recession in demand from the general trade brought a decline in the volume of bookings last week for sheets. The uptrend during Septem-

ber and the first week of this month has stopped, and consumers are apparently covered for present needs. Accordingly, production has been slightly curtailed as mill operators adjust schedules to conform with the demand.

Old Material

With virtually no new business and mills restricting shipments on contracts, the district scrap market is dull. Prices have weakened, although there has been no real test. Dealers are bidding less on virtually all the items than a week ago and in many instances are only piling scrap.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel.....\$10.25 to \$10.75
Scrap rails for melting.... 11.50 to 12.00
Loose sheet clippings..... 6.75 to 7.25
Bundled sheets 9.25 to 9.75
Cast iron borings..... 6.00 to 6.50
Machine shop turnings.... 6.00 to 6.50
No. 1 busheling..... 8.50 to 9.00
No. 2 busheling..... 6.00 to 6.50
Rails for rolling..... 12.50 to 13.00
No. 1 locomotive tires.... 13.00 to 13.50
No. 2 railroad wrought... 10.25 to 10.75
Short rails 15.75 to 16.25
Cast iron carwheels..... 12.00 to 12.50
No. 1 machinery cast..... 14.50 to 15.00
No. 1 railroad cast..... 12.50 to 13.00
Burnt cast 7.00 to 7.50
Stove plate 7.00 to 7.50
Brake shoes 7.00 to 7.50
Agricultural malleable 12.50 to 13.00
Railroad malleable 13.50 to 14.00

Rolled steel wheels..... 14.50 to 15.00
Low phos. billet and bloom ends 15.50 to 16.00
Electric Furnace Grades:
Short shov. steel turnings.. 9.75 to 10.25
Blast Furnace Grades:
Short mixed borings and turnings 8.00 to 8.50
Cast iron borings..... 8.00 to 8.50
No. 2 busheling..... 7.00
Rolling Mill Grades:
Steel car axles..... 15.00 to 15.50
Iron axles 19.00 to 19.50
Cupola Grades:
No. 1 machinery cast..... 11.00 to 11.50
Stove plate 10.00 to 10.50
Locomotive grate bars.... 8.25 to 9.25
Steel rails, 3 ft. and under 15.00 to 15.50
Cast iron carwheels..... 13.50 to 14.00
Malleable Grades:
Industrial 14.00 to 14.50
Railroad 14.00 to 14.50
Agricultural 14.00 to 14.50
Special Grades:
Chemical borings 11.50 to 12.00

Navy Awards Two Ships Costing \$36,000,000

WASHINGTON, Oct. 21.—The Newport News Shipbuilding & Dry Dock Co. last week was awarded the contract for construction of an airplane carrier, the first ever to be built for the United States Navy. It will require 7880 tons of finished steel and 150 tons of castings. The cost is \$19,000,000.

The Navy Department also awarded to its Mare Island yard a contract to build a light cruiser, to cost \$17,000,000.

BUFFALO Lower Pig Iron Prices Bring No Marked Gain in Bookings

BUFFALO, Oct. 21.—The reduction in the price of pig iron made last week has not resulted in heavy bookings. It has, however, removed some of the attitude of caution on the part of district melters, and in a few cases contracts have been closed. Aggregate sales of 5000 to 6000 tons since the reduction in price are reported. All of this, however, did not come from this district. There has been some renewed activity in barge canal shipment before the waterway is closed for navigation for the year.

Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25.....\$17.50
No. 2X fdy., sil. 2.25 to 2.75..... 18.00
No. 1 fdy., sil. 2.75 to 3.25..... 19.00
Malleable, sil. up to 2.25..... 18.00
Basic 17.50
Lake Superior charcoal..... 27.28

Warehouse Prices, f.o.b. Buffalo

Base per Lb.
Plates and struc. shapes..... 3.25c.
Soft steel bars..... 3.15c.
Reinforcing bars 2.95c.
Cold-fin. flats and sq..... 3.65c.
Rounds and hex..... 3.15c.
Cold-rolled strip steel..... 5.85c.
Black sheets (No. 24)..... 4.20c.
Galv. sheets (No. 24)..... 4.60c.
Bands 3.50c.
Hoops 3.90c.
Blue ann'd sheets (No. 10)..... 3.50c.
Com. wire nails, base per keg..... \$2.60
Black wire, base per 100 lb..... 3.20

Finished Steel

Mill operation in the Buffalo territory has been slightly increased during the past week. The Lackawanna plant of the Bethlehem Steel Co. is operating 15 open-hearth as against 13 last week. This is the best operation in months. The Donner plant is operating four open-hearth and Wickwire-Spencer two.

Old Material

The largest consumer in the district has bought about 5000 tons of No. 1 and No. 2 heavy melting steel at \$12.50 and \$11 respectively. The market otherwise remains very quiet, with no other important outstanding transactions. Users have apparently heavy stocks of scrap material and are not interested in buying. Most prices are nominal and show softening.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:
No. 1 heavy melting steel.. \$12.50
No. 2 heavy melting scrap. 11.00
Scrap rails \$12.00 to 12.50
Hydraulic comp. sheets... 10.50 to 11.00
Hand bundled sheets..... 8.00 to 8.50
Drop forge flashings..... 10.50 to 11.00
No. 1 busheling..... 10.50 to 11.00
Hvy. steel axle turnings... 11.00 to 11.50
Machine shop turnings.... 6.00 to 7.00
No. 1 railroad wrought... 10.00 to 10.50
Acid Open-Hearth Grades:
Knuckles and couplers.... 14.50 to 15.00
Coil and leaf springs..... 14.50 to 15.00

Lake Superior Iron Ore Consumption Lower

Consumption of Lake Superior ore in September is reported by the Lake Superior Iron Ore Association at 3,281,573 gross tons, a reduction of 391,588 tons, or almost 11 per cent, from the August total of 3,673,161 tons. Compared with the 5,361,567 tons in September, 1929, the reduction was about 39 per cent.

Ore on hand at furnaces Oct. 1 is given as 32,322,567 tons. To this should be added ore on Lake Erie docks, aggregating 6,043,489 tons, making a total supply of 38,366,056 tons. This is less than 1 per cent more than the total supply Oct. 1, 1929, which stood at 38,125,312 tons. These figures represent furnaces numbering 251, of which 123 were in blast on the last day of August and 112 on the last day of September.

Malleable Castings Orders Up Slightly Last Month

WASHINGTON, Oct. 21.—Orders for malleable castings in September totaled 25,753 tons, as against 25,409 tons in August, according to reports received by Department of Commerce from 117 firms. Production also made a slight increase, rising to 26,510 tons from 25,614 tons.

▲▲ Semi-Finished Steel, Raw Materials, Bolts and Rivets ▲▲

Mill Prices of Semi-Finished Steel

Billets and Blooms		Sheet Bars (Open Hearth or Bessemer)		Skelp (F.o.b. Pittsburgh or Youngstown)	
	Per Gross Ton		Per Gross Ton		Per Lb.
Rerolling, 4-in. and under 10-in., Pitts-		Pittsburgh	\$31.00	Grooved	1.60c. to 1.70c.
burgh	\$31.00	Youngstown	31.00	Universal	1.60c. to 1.70c.
Rerolling, 4-in. and under 10-in., Youngs-		Cleveland	31.00	Sheared	1.60c. to 1.70c.
town	31.00				
Rerolling, 4-in. and under 10-in., Cleve-		Slabs		Wire Rods	
land	31.00	(8 in. x 2 in. and under 10 in. x 10 in.)		(Common soft, base)	
Rerolling, 4-in. and under 10-in., Chicago	32.00				Per Gross Ton
Forging quality, Pittsburgh	36.00	Pittsburgh	\$31.00	Pittsburgh	\$36.00
		Youngstown	31.00	Cleveland	36.00
		Cleveland	31.00	Chicago	37.00

Prices of Raw Material

Ores		Ferromanganese		Fluxes and Refractories	
Lake Superior Ores, Delivered Lower Lake Ports					
	Per Gross Ton		Per Gross Ton	Fluorspar	Per Net Ton
Old range Bessemer, 51.50% iron	\$4.80	Domestic, 80%, seaboard	\$94.00 to \$99.00	Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	\$18.00
Old range non-Bessemer, 51.50% iron	4.65	Foreign, 80%, Atlantic or Gulf port, duty paid	94.00 to 99.00	No. 2 lump, Illinois and Kentucky mines	20.00
Mesabi Bessemer, 51.50% iron	4.65	Spiegeleisen		Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	\$17.00 to \$17.50
Mesabi non-Bessemer, 51.50% iron	4.50		Per Gross Ton Furnace	Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/2% silica, f.o.b. Illinois and Kentucky mines	32.50
High phosphorus, 51.50% iron	4.40	Domestic, 19 to 21%	\$31.00 to \$33.00		
Foreign Ore, c.i.f. Philadelphia or Baltimore		Domestic, 16 to 19%	29.00 to 32.00	Fire Clay Brick	
	Per Unit	Electric Ferrosilicon			Per 1000 f.o.b. Works
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algeria	.8c. to 9c.		Per Gross Ton Delivered	High-Heat	Intermediate
Iron ore, low phos., Swedish, average 68% iron	11c.	50%	\$83.50	Duty Brick	Heavy Duty Brick
Iron ore, basic Swedish, average 65% iron	9c.	75%	130.00		
Manganese ore, washed 52% manganese, from the Caucasus	.26c. to .28c.		Per Gross Ton Furnace	Pennsylvania	\$43.00 to \$46.00 \$35.00 to \$38.00
Manganese ore, Brazilian, African or Indian, basic 50%	.26c. to .28c.	10%	\$35.00	Maryland	43.00 to 46.00 35.00 to 38.00
Tungsten ore, high grade, per unit, in 60% concentrates	\$12.00 to \$14.00	11%	37.00	New Jersey	50.00 to 65.00
	Per Gross Ton	Bessemer Ferrosilicon		Ohio	43.00 to 46.00 35.00 to 38.00
Chrome ore, 45 to 50% Cr ₂ O ₃ crude, c.i.f. Atlantic seaboard	\$22.00 to \$24.00		Per Gross Ton	Kentucky	43.00 to 46.00 35.00 to 38.00
Molybdenum ore, 85% concentrates of MoS ₂ delivered	.50c. to .55c.	10%	\$26.50	Missouri	43.00 to 46.00 35.00 to 38.00
		11%	28.50	Illinois	43.00 to 46.00 35.00 to 38.00
		12%	30.50	Ground fire clay, per ton	7.00
Coke		Silvery Iron		Silica Brick	
	Per Net Ton		Per Gross Ton		Per 1000 f.o.b. Works
Furnace, f.o.b. Connellsville prompt	\$2.60	F.o.b. Jackson County, Ohio, Furnace			
Foundry, f.o.b. Connellsville prompt	3.25 to 4.75		Per Gross Ton	Pennsylvania	\$43.00
Foundry, by-products, Ch'go ovens	8.00	6%	\$21.00	Chicago	52.00
Foundry, by-products, New England, del'd.	11.00	7%	21.50	Birmingham	50.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40	8%	22.00	Silica clay, per ton	\$8.50 to 10.00
Foundry, by-product, Phila.	9.00	9%	22.50		
Foundry, Birmingham	5.00	10%	23.00	Magnesite Brick	
Foundry, by-product, St. Louis, f.o.b. ovens	8.00	Delivered prices at Chicago are about 50c. a ton below this schedule.	31.00		Per Net Ton
Foundry by-prod., del'd St. Louis	9.00	Other Ferroalloys		Standard sizes, f.o.b. Baltimore and Chester, Pa.	\$65.00
Coal		Ferrotungsten, per lb. contained metal del'd	\$1.30 to \$1.40	Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
	Per Net Ton	Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.00c.	Standard size	45.00
Mine run steam coal, f.o.b. W. Pa. mines	\$1.25 to \$1.35	Ferrovanadium, per lb. contained vanadium, f.o.b. furnace	\$3.15 to \$3.65	Chrome Brick	
Mine run coking coal, f.o.b. W. Pa. mines	1.40 to 1.50	Ferrocantitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	\$160.00		Per Net Ton
Gas coal, 1/4-in., f.o.b. Pa. mines	1.70 to 1.80	Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton	\$91.00	Standard size	\$45.00
Mine run gas coal, f.o.b. Pa. mines	1.50 to 1.60	Ferrophosphorus, electric 24%, f.o.b. An-niston, Ala., per gross ton	\$122.50		
Steam slack, f.o.b. W. Pa. mines	.35 to .55				
Gas slack, f.o.b. W. Pa. mines	.90 to 1.00				

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts		Bolts and Nuts		Small Rivets (1/8-in. and smaller)	
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)			Per Cent Off List		Per Cent Off List
†Machine bolts	.73	Semi-finished hexagon nuts	.73	F.o.b. Pittsburgh	.70, 10 and 5
†Carriage bolts	.73	Semi-finished hexagon castellated nuts, S.A.E.	.73	F.o.b. Cleveland	.70, 10 and 5
Lag bolts	.73	Stove bolts in packages, P'gh	.80, 10, 10 and 5	F.o.b. Chicago	.70, 10 and 5
Plow bolts, Nos. 1, 2, 3 and 7 heads	.73	Stove bolts in packages, Chicago	.80, 10, 10 and 5		
Hot-pressed nuts, blank or tapped, square	.73	Stove bolts in packages, Cleveland	.80, 10, 10 and 5	Cap and Set Screws	
Hot-pressed nuts, blank or tapped, hexagons	.73	Stove bolts in bulk, P'gh	.80, 10, 10, 5 and 2 1/2	(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)	
C.p.c. and t. square or hex. nuts, blank or tapped	.73	Stove bolts in bulk, Chicago	.80, 10, 10, 5 and 2 1/2		Per Cent Off List
Washers*	.70c. to 6.75c. per lb. off list	Stove bolts in bulk, Cleveland	.80, 10, 10, 5 and 2 1/2	Milled cap screws	.80, 10, 10 and 5
		Tire bolts	.60, 10 and 10	Milled standard set screws, case hardened	80 and 5
				Milled headless set screws, cut thread	.75 and 10
		Discounts of 73 per cent off on bolts and nuts apply on carload business with jobbers and large consumers.		Upset hex. head cap screws, U.S.S. thread	.85 and 10
		Large Rivets (1/2-in. and larger)		Upset set screws, S.A.E. thread	.85 and 10
			Base per 100 Lb.	Milled studs	.70
		F.o.b. Pittsburgh or Cleveland	\$2.75		
		F.o.b. Chicago	2.85		

▲▲▲ Mill Prices of Finished Iron and Steel Products ▲▲▲

Iron and Steel Bars

Soft Steel	
	Base per Lb.
F.o.b. Pittsburgh mill.....	1.60c. to 1.65c.
F.o.b. Chicago.....	1.70c.
Del'd Philadelphia.....	1.89c. to 1.94c.
Del'd New York.....	1.93c. to 1.98c.
F.o.b. Cleveland.....	1.60c. to 1.65c.
F.o.b. Lackawanna.....	1.70c. to 1.75c.
F.o.b. Birmingham.....	1.80c.
C.i.f. Pacific ports.....	2.25c.
F.o.b. San Francisco mills.....	2.25c.

Billet Steel Reinforcing

F.o.b. P'gh mills, 40, 50, 60-ft.....	1.70c. to 1.75c.
F.o.b. Birmingham, mill lengths.....	1.80c.

Rail Steel

F.o.b. mills, east of Chicago dist.....	1.55c.
F.o.b. Chicago Heights mill.....	1.65c.
Del'd Philadelphia.....	1.84c. to 1.89c.

Iron

Common iron, f.o.b. Chicago.....	1.70c.
Refined iron, f.o.b. P'gh mills.....	2.75c.
Common iron, del'd Philadelphia.....	2.09c.
Common iron, del'd New York.....	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.60c.
F.o.b. Chicago.....	1.70c. to 1.75c.
F.o.b. Birmingham.....	1.80c.
Del'd Cleveland.....	1.78 1/2 c. to 1.85 1/2 c.
F.o.b. Coatesville.....	1.70c.
F.o.b. Sparrows Point.....	1.70c.
F.o.b. Lackawanna.....	1.70c.
Del'd New York.....	1.88c.
C.i.f. Pacific ports.....	2.05c. to 2.15c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.60c.
F.o.b. Chicago.....	1.70c. to 1.75c.
F.o.b. Birmingham.....	1.80c.
F.o.b. Lackawanna.....	1.70c. to 1.75c.
F.o.b. Bethlehem.....	1.70c.
Del'd Cleveland.....	1.78 1/2 c.
Del'd Philadelphia.....	1.71c. to 1.76c.
Del'd New York.....	1.85 1/2 c.
C.i.f. Pacific ports.....	2.15c. to 2.25c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh.....	1.70c. to 1.75c.
Wider than 6 in., P'gh.....	1.60c. to 1.65c.
6 in. and narrower, Chicago.....	1.80c. to 1.85c.
Wider than 6 in., Chicago.....	1.70c. to 1.75c.
Cooperage stock, P'gh.....	1.90c. to 2.00c.
Cooperage stock, Chicago.....	2.00c. to 2.10c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill.....	2.10c.
Bars, f.o.b. Chicago.....	2.10c.
Bars, Cleveland.....	2.10c.
Bars, Buffalo.....	2.10c.
Shafting, ground, f.o.b. mill.....	2.45c. to 3.40c.
Strips, P'gh.....	2.35c. to 2.45c.
Strips, Cleveland.....	2.35c. to 2.45c.
Strips, del'd Chicago.....	2.63c.
Strips, Worcester.....	2.50c. to 2.60c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland.....	3.60c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Merchant Trade	
	Base per Keg
Standard wire nails.....	\$2.00 to \$2.10
Cement coated nails.....	2.00 to 2.10
Galvanized nails.....	4.00 to 4.10

Base per Lb.	
Polished staples.....	2.60c. to 2.70c.
Galvanized staples.....	2.35c. to 2.95c.
Barbed wire, galvanized.....	2.80c. to 2.90c.
Annealed fence wire.....	2.15c. to 2.25c.
Galvanized wire, No. 9.....	2.60c. to 2.70c.
Woven wire fence (per net ton to retailers).....	\$65.00

To Manufacturing Trade

Bright hard wire, Nos. 6 to 9 gage.....	2.30c.
Spring wire.....	3.30c.

(Carload lots, f.o.b. Chicago)

Wire nails.....	\$2.05 to \$2.10
Annealed fence wire.....	2.40c. to 2.50c. (lb.)
Bright hard wire to manufacturing trade.....	2.35c.

Anderson, Ind., mill prices are ordinarily \$1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.

Light Plates

	Base per Lb.
No. 10, blue annealed, f.o.b. P'gh.....	1.90c. to 2.00c.
No. 10, blue annealed, f.o.b. Chicago dist.....	2.10c.
No. 10, blue annealed, del'd Phila.....	2.32c. to 2.42c.
No. 10, blue annealed, B'ham.....	2.15c.

Sheets

Blue Annealed	
	Base per Lb.
No. 13, f.o.b. P'gh.....	2.05c. to 2.15c.
No. 13, f.o.b. Chicago dist.....	2.25c.
No. 13, del'd Philadelphia.....	2.44c.
No. 13, blue annealed, B'ham.....	2.30c.
Box Annealed, One Pass Cold Rolled	
No. 24, f.o.b. Pittsburgh.....	2.35c. to 2.45c.
No. 24, f.o.b. Chicago dist. mill.....	2.55c.
No. 24, del'd Philadelphia.....	2.64c. to 2.74c.
No. 24, f.o.b. Birmingham.....	2.60c.

Steel Furniture Sheets

No. 24, f.o.b. P'gh.....	3.60c. to 3.70c.
Galvanized	
No. 24, f.o.b. Pittsburgh.....	3.00c. to 3.10c.
No. 24, f.o.b. Chicago dist. mill.....	3.10c. to 3.20c.
No. 24, del'd Cleveland.....	3.18 1/2 c. to 3.28 1/2 c.
No. 24, del'd Philadelphia.....	3.29c. to 3.39c.
No. 24, f.o.b. Birmingham.....	3.15c.

Continuous Mill Sheets

No. 10 gage.....	1.75c. to 1.80c.
No. 13 gage.....	1.90c. to 1.95c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh.....	2.70c.
No. 28, f.o.b. Chicago dist. mill.....	2.80c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh.....	3.40c. to 3.50c.
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Long Ternes

No. 24, 8-lb. coating, f.o.b. mill.....	3.45c. to 3.55c.
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Vitreous Enameling Stock

No. 24, f.o.b. Pittsburgh.....	3.70c.
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Tin Plate

Per Base Box	
Standard cokes, f.o.b. P'gh district mills.....	\$5.00
Standard cokes, f.o.b. Gary.....	5.10

Terne Plate

(F.o.b. Morgantown or Pittsburgh)	
(Per Package, 20 x 28 in.)	
8-lb. coating I.C. \$10.30	25-lb. coating I.C. \$15.20
15-lb. coating I.C. 12.90	30-lb. coating I.C. 16.00
20-lb. coating I.C. 14.00	40-lb. coating I.C. 17.80

Alloy Steel Bars

(F.o.b. maker's mill)	
Alloy Quantity Bar Base, 2.65c. per Lb.	
S.A.E. Series	Alloy Differential
2000 (1 1/2% Nickel).....	\$0.25
2100 (1 1/4% Nickel).....	0.55
2300 (3 1/2% Nickel).....	1.50
2500 (5% Nickel).....	2.25
3100 Nickel Chromium.....	0.55
3200 Nickel Chromium.....	1.35
3300 Nickel Chromium.....	3.80
3400 Nickel Chromium.....	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum).....	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum).....	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum 1.25 to 1.75 Nickel).....	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium).....	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium).....	0.45
5100 Chromium Spring Steel.....	0.20
6100 Chromium Vanadium Bar.....	1.20
6100 Chromium Vanadium Spring Steel.....	0.95
9250 Silicon Manganese Spring Steel (flats).....	0.25
Rounds and squares.....	0.50
Chromium Nickel Vanadium.....	1.50
Carbon Vanadium.....	0.95

Above prices are for hot rolled steel bars, forging quality. The differential for cold-drawn bars is 3/4 c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2 1/2 in. thick, regardless of sectional area, take the bar price.

Rails

Per Gross Ton	
Standard, f.o.b. mill.....	\$43.00
Light (from billets), f.o.b. mill.....	34.00
Light (from rail steel), f.o.b. mill.....	82.00
Light (from billets), f.o.b. Ch'go mill.....	36.00

Track Equipment

Base per 100 Lb.	
Spikes, 3/4 in. and larger.....	\$2.80
Spikes, 1/2 in. and smaller.....	2.80

Spikes, boat and barge.....	3.00
Tie plate, steel.....	2.07 1/2
Angle bars.....	\$2.75
Track bolts, to steam railroads.....	\$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count.....	.75 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills	
Butt Weld	
Steel	Iron
Inches	Black Galv.
1/8.....	47 21 1/2 1/4 and 3/8 +11 +36
1/4 to 3/8.....	53 27 1/2 1/2..... 23 5
1/2.....	58 44 1/2 3/4..... 28 11
3/4.....	62 50 1/2 1 and 1 1/4 81 15
1 to 3.....	64 52 1/2 1 1/2 and 2 35 18
Lap Weld	
2.....	57 45 1/2 2..... 23 9
2 1/2 to 6.....	61 49 1/2 2 1/2 to 3 1/2 28 18
7 and 8.....	58 45 1/2 4 to 6..... 30 17
9 and 10.....	56 43 1/2 7 and 8..... 29 16
11 and 12.....	55 42 1/2 9 to 12..... 26 11
Butt Weld, extra strong, plain ends	
1/8.....	43 26 1/2 1/4 and 3/8 +13 +48
1/4 to 3/8.....	49 32 1/2 1/2..... 28 7
1/2.....	55 44 1/2 3/4..... 28 12
3/4.....	60 49 1/2 1 to 2..... 34 18
1 to 1 1/2.....	62 51 1/2
2 to 3.....	63 52 1/2
Lap Weld, extra strong, plain ends	
2.....	55 44 1/2 2..... 29 13
2 1/2 to 4.....	59 48 1/2 2 1/2 to 4..... 34 20
4 1/2 to 6.....	58 47 1/2 4 1/2 to 6..... 33 19
7 to 8.....	54 41 1/2 7 and 8..... 31 17
9 and 10.....	47 34 1/2 9 to 12..... 21 8
11 and 12.....	46 33 1/2

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1 1/2 points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discount of 5 and 2 1/2%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2 1/2 points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh	
Steel	Charcoal Iron
2 in. and 2 1/4 in.....	1 1/2 in..... 1
2 1/2 in.—2 3/4 in.....	1 3/4 in..... 8
3 in.....	2 in.—2 1/4 in..... 18
3 1/4 in.—3 1/2 in.....	2 1/2 in.—2 3/4 in..... 16
4 in.....	3 in..... 17
4 1/2 in. to 6 in.....	3 1/2 in. to 3 3/4 in..... 18
	4 in..... 20
	4 1/2 in..... 21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts: Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn	
1 in.....	61 3 in..... 46
1 1/4 to 1 1/2 in.....	58 3 1/2 to 3 3/4 in..... 48
1 3/4 in.....	37 4 in..... 51
2 to 2 1/4 in.....	32 4 1/2, 5 and 6 in..... 40
2 1/2 to 2 3/4 in.....	40
Hot Rolled	
2 and 2 1/4 in.....	38 3 1/2 to 3 3/4 in..... 54
2 1/2 and 2 3/4 in.....	46 4 in..... 57
3 in.....	52 4 1/2, 5 and 6 in..... 48

Beyond the above base discount a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Per Cent Off List	
Carbon, 0.10% to 0.30% base (carloads).....	55
Carbon, 0.30% to 0.40% base.....	50
Plus differentials for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.	

Fabricated Structural Steel

Awards of 48,000 Tons Largest Since July—New Projects Include Philadelphia Subway

AWARDS of fabricated steel totaling 48,000 tons are larger than in any week since the middle of July. Included in this total are 16,670 tons in a bridge over the Hackensack and Passaic rivers for the State of New Jersey, about 5000 tons in five apartment buildings in New York, 2000 tons for a merchant mill at the Great Lakes Steel Corp., Ecorse, Mich., 3400 tons for the Mills Building in San Francisco and 2000 tons for repairs on the Narrows bridge at Vancouver, B. C.

New projects for fabricated structural steel totaling 22,000 tons are the smallest since early in September. More than half the total of new business is in a Philadelphia subway section on Locust Street and Pennsylvania Avenue, requiring 9500 tons, and additional construction on the Union Terminal in Cincinnati, requiring 5000 tons. Awards follow:

North Atlantic States

WORCESTER, MASS., 1500 tons of plates for 36-in. water mains, to Lukens Steel Co.
 EVERETT, MASS., 307 tons, Merrimac Chemical Co. unit, to Palmer Steel Co.
 HOLYOKE, MASS., 250 tons, school, to an unnamed fabricator.
 BARRE, VT., 200 tons, granite cutting shed, to Palmer Steel Co.
 ANDOVER, MASS., 118 tons, chapel, to New England Structural Co.
 SALEM, MASS., 104 tons, laundry, to Palmer Steel Co.
 BOSTON & ALBANY RAILROAD, 100 tons, bridge at Niverville, N. Y., to Boston Bridge Works, Inc.
 FITCHBURG, MASS., 700 tons, plant for Simonds Saw & Steel Co., to Austin Co.
 NEW YORK CENTRAL RAILROAD, 200 tons, for grade crossing elimination in Ohio, to American Bridge Co.
 NEW YORK, 700 tons, apartment building on East Seventy-first Street, to Lehigh Structural Steel Co.
 NEW YORK, 800 tons, apartment building at Christopher and Greenwich Streets, to Lehigh Structural Steel Co.
 NEW YORK, 1210 tons, apartment building at 302 West Twelfth Street, to American Bridge Co.
 NEW YORK, 1045 tons, apartment building at 45 Christopher Street, to Harris Structural Steel Co.
 NEW YORK, 1320 tons, apartment building at 299 West Twelfth Street, to Harris Structural Steel Co.
 HOLLY STATION, N. Y., 278 tons, bridge for New York Central Railroad, to McClintic-Marshall Co.
 ATHOL SPRINGS, N. Y., 120 tons bridge for Nickel Plate Railroad, to Bethlehem Steel Co.
 EAST ORANGE, N. J., 567 tons, store for B. Altman & Co., to Lehigh Structural Steel Co.
 STATE OF NEW JERSEY, 16,670 tons, bridge over Passaic and Hackensack rivers, to McClintic-Marshall Co.
 PHILADELPHIA, 200 tons, Rising Sun Avenue bridge, to Bethlehem Steel Co.
 SAFE HARBOR, PA., 250 tons, pier work for Arundel Corp., to McClintic-Marshall Co.
 LYCOMING COUNTY, PA., 710 tons, three highway bridges, to McClintic-Marshall Co.
 GROVE CITY, PA., 135 tons, building for Grove City College, to Pittsburgh Bridge & Iron Works.
 PITTSBURGH, 760 tons, Ardmore Boulevard bridge, to Fort Pitt Bridge Works.

The South

BALTIMORE & OHIO RAILROAD, 2170 tons, bridge at Harpers Ferry, Va., to American Bridge Co.

MAYSVILLE, KY., 2600 tons, bridge, to McClintic-Marshall Co.
 NEW ORLEANS, 225 tons, academic high school, to Virginia Bridge & Iron Co.

Central States

ECORSE, MICH., 2000 tons, merchant mill for Great Lakes Steel Corp., to McClintic-Marshall Co.
 CINCINNATI, 790 tons, Smith Street bridge, to McClintic-Marshall Co.
 LONDON, OHIO, 450 tons, prison dormitories, to Reliance Structural Steel Co.
 YOUNGSTOWN, 850 tons, filtration plant, to Niles Forge & Mfg. Works.
 TRACY, IOWA, 580 tons, bridge, to Pittsburgh-Des Moines Steel Co.
 JEFFERSON CITY, MO., 1689 tons; 689 tons for bridge across Meramec River at Kirkwood, Mo., and 1000 tons for bridge across Niangua River in Camden County, Mo., to Wisconsin Bridge & Iron Co.

Western States

TULSA, OKLA., 600 tons, bridge, to Rochester Bridge Co.
 ELDORADO, ARK., 400 tons, bridge, to Arkansas Foundry Co.
 LOS ANGELES, 100 tons, John Marshall School, to Minneapolis-Moline Power Implement Co.
 LOS ANGELES, 325 tons, newspaper building on Wilcox Street, to McClintic-Marshall Co.
 SAN FRANCISCO, 3400 tons, Mills Building, to McClintic-Marshall Co.
 SAN FRANCISCO, 100 tons, apartment building, Haight and Steiner streets, to McClintic-Marshall Co.
 PHOENIX, ARIZ., 205 tons, bridge on Ashfork-Kingman highway, to Virginia Bridge & Iron Co.

Canada

BROCKVILLE, ONT., 300 tons, addition to plant of Eugene F. Phillips Co., to Hamilton Bridge Co.
 MONTREAL, 300 tons, Guaranteed Milk Co. factory, to Dominion Bridge Co.
 MOOSE JAW, SASK., 500 tons, Winnipeg technical school, to Dominion Bridge Co.
 VANCOUVER, B. C., 2000 tons, repairs to Narrows Bridge, to Dominion Bridge Co.

STRUCTURAL PROJECTS PENDING
 Inquiries for fabricated steel work include the following:

North Atlantic States

PITTSFIELD, MASS., 1500 tons, General Electric Co. transformer manufacturing plant.
 SAYLESVILLE, R. I., 360 tons, finishing plant.
 NEW YORK CENTRAL RAILROAD, 500 tons, grade crossings.
 PHILADELPHIA, 9500 tons, subway on Locust Street and Pennsylvania Avenue.

DARBY, PA., 319 tons, bridge over Darby Creek; Central Pennsylvania Construction Co., contractor.

PENNSYLVANIA RAILROAD, 500 tons, bridges over Hackensack and Passaic Rivers; Fort Pitt Bridge Works, low bidder.

Central States

CLEVELAND, 800 tons, John Marshall School.
 CINCINNATI, 5000 tons additional construction work in connection with Union Terminal project.
 ILLINOIS CENTRAL RAILROAD, 720 tons, viaduct and Randolph Street station at Chicago.
 CHICAGO HEIGHTS, 500 tons, high school.
 MISSOURI PACIFIC RAILROAD, 450 tons, bridge.
 MILWAUKEE, 100 tons, addition to sewage disposal plant.
 TREMPEREAU, WIS., 325 tons, State highway bridge; A. O. Clark, Wausau, Wis., low bidder.
 STATE OF IOWA, 600 tons, highway bridges.

Western States

KANSAS CITY, MO., 1000 tons, Oak Street viaduct.
 DENVER, 600 tons, theater.
 SEATTLE, 10,000 tons, plates, pipe line; Western Pipe & Steel Co., low bidder.
 ROCK ISLAND, WASH., 1200 tons, dam; bids opened.
 PHOENIX, ARIZ., 300 tons, bridge on Flagstaff highway; bids opened.

September Motor Output Nearly Equals August

WASHINGTON, Oct. 21.—Making a decline of only 117 units, production of motor vehicles in the United States in September was 222,931, against 223,048 in August, according to the Department of Commerce. The total was the smallest since last December. The passenger car output dropped to 180,547 from 187,037, while truck production rose to 41,975 from 35,760, and taxicab output increased to 409 from 251.

Production of motor vehicles in Canada in September was 7957 units, against 9792 in August, being the smallest since last December. Passenger car output was 5623, compared with 6946 in August, and truck production was 2334, against 2846.

Total United States output for nine months was 2,927,891 units, a decline of 37 per cent from the 4,640,823 units in the same period of 1929. Passenger cars dropped 38 per cent to 2,485,049 and trucks 31 per cent to 437,420. Taxicabs numbered only 5422, or 60 per cent less than last year.

Scrap Moved on Railroads 13,527,292 Tons in 1929

Railroads of the United States carried 13,527,292 tons of scrap iron and steel during 1929, bringing a freight revenue of \$29,428,516, it is announced in a report issued by Benjamin Schwartz, director general of the Institute of Scrap Iron and Steel, Inc. This represents an increase over 1928 of 1,780,355 tons and \$3,565,501 in freight revenue. The net revenue per ton of scrap iron and steel was \$2.18, an increase of 6c. over 1928.

▲▲▲ Non-Ferrous Metal Markets ▲▲▲

Copper Quiet and Firm—Tin Higher—Lead Active—Zinc Weak

NEW YORK, Oct. 21.

Copper

Uppermost in the minds of copper producers is the question of curtailing output. It is reported that some important steps are being taken, particularly in conjunction with foreign interests. Representatives of Belgian producers are expected in this country late this month for a conference. Some highly interesting data appeared in the public press today, showing that in September the production of the United States and South American producers had declined 37 per cent from a year ago, whereas the output of Africa and Canada had increased 50.8 per cent and 120 per cent respectively, while the world output had declined 23.3 per cent. As soon as definite steps are taken to reduce copper output and as soon as monthly statistics begin to show a decline in stocks of refined metal, a much firmer and more satisfactory situation will result, it is pointed out.

The week has been very quiet both in domestic and foreign sales. Melters abroad have taken thus far 28,000 tons, which is 3000 tons more than the September total. Prices are quite firm at 10c., delivered Connecticut valley, for electrolytic copper, with Copper Exporters, Inc., still quoting 10.30c., c.i.f. usual European ports. There are still a few distress lots of copper, which are being offered at 9.75c. to 9.87½c. Lake copper is quiet but firm at 10c. to 10.12½c., delivered.

Tin

As was to be expected, after a drastic decline, market prices have been advancing since a week ago, with the culmination in London today. Quotations over there today were about £9 a ton higher than a week ago, with spot standard quoted at £118 7s. 6d., future standard at £120 and spot Straits at £123 12s. 6d. The Singapore price today was £125 5s. Spot Straits tin on this side today was 27.12½c., New York, which compares with a low last week of 24.62½c.

Owing to heavy buying by consumers on the way down, there has been very little buying the past week. The little metal that was sold was mostly for nearby delivery and purchased by those who usually buy only spot metal. In the heavy sales about a week ago, deliveries extended through May. Stocks in London warehouses on Oct. 18 were 24,523 tons, a decline of 221 tons from the week before. This

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	Oct. 21	Oct. 20	Oct. 18	Oct. 17	Oct. 16	Oct. 15
Lake copper, New York.....	10.12½	10.12½	10.12½	10.12½	10.12½	10.12½
Electrolytic copper, N. Y.*.....	9.75	9.75	9.75	9.75	9.75	9.75
Straits tin, spot, N. Y.	27.12½	26.75	...	26.50	25.87½	25.62½
Zinc, East St. Louis.....	4.00	4.00	4.00	3.95	3.95	4.00
Zinc, New York.....	4.35	4.35	4.35	4.30	4.30	4.35
Lead, East St. Louis.....	4.95	4.95	4.95	4.95	4.95	4.95
Lead, New York.....	5.10	5.10	5.10	5.10	5.10	5.10

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

is the fourth major decline in as many weeks.

The report two weeks ago that the Tin Producers' Association in London would soon dissolve has been denied, and no announcement has been given out. It is the suspicion on this side that the circumstances are such that, while the association may continue in name, it will ultimately be in name only.

Lead

Prices have steadied during the week, after declining rapidly, and sales have been very large. Producers report orders from a wide diversity of users covering shipments into November, and the week has been one of the best in a long time. London has been advancing instead of declining, which causes prices here to be firm at 4.95c., St. Louis, or 5.10c., New York, which is the contract price of the leading

interest. Today the London price is equivalent to 5.26c., New York. September statistics were quite favorable to producers and showed American stocks to be about 73,000 tons, or not much more than a month's supply.

Zinc

Slight further declines in prime Western zinc appeared during the week, the metal selling at 3.95c., East St. Louis, though the quantity involved was not large. In the last two days the market was stronger, and 4c. is regarded as the minimum at East St. Louis, or 4.35c., New York. While some business has been done each day at prevailing prices, the volume has not been large.

Further declines in ore prices have occurred and the price now stands at \$27, Joplin. Output is still large at 9400 tons last week, with shipments at 8423 tons, bringing the surplus to

New York, Chicago or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass	17.00c.
Copper, hot rolled, base sizes.....	20.00c.
Copper, cold rolled, 14 oz. and heavier, base sizes.....	22.00c.
Seamless Tubes—	
Brass	22.00c.
Copper	22.25c.
Brass Rods	15.12½c.
Brazed Brass Tubes.....	24.67½c.

New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks	9.75c. to 10.25c.
Zinc sheets, open.....	10.75c. to 11.25c.

Metals from New York Warehouse

Delivered Prices, per Lb.

Tin, Straits pig.....	28.50c. to 29.50c.
Tin, bar	30.50c. to 31.50c.
Copper, Lake	11.75c.
Copper, electrolytic	11.50c.
Copper, casting	11.25c.
Zinc, slab	5.75c. to 6.75c.
Lead, American pig.....	6.00c. to 7.00c.
Lead, bar	8.00c. to 9.00c.
Antimony, Asiatic	10.00c. to 10.50c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure).....	24.00c. to 25.00c.
Alum. ingots, No. 12 alloys	23.00c. to 24.00c.
Babbitt metal, commercial grade	25.00c. to 35.00c.
Solder, ½ and ½	20.50c. to 21.50c.

Metals from Cleveland Warehouse

Delivered Prices, per Lb.

Tin, Straits pig.....	31.00c.
Tin, bar	33.00c.
Copper, Lake	11.13c.
Copper, electrolytic	11.13c.
Copper, casting	10.75c.
Zinc, slab	5.50c. to 6.75c.
Lead, American pig.....	5.75c. to 6.00c.
Lead, bar	8.50c.
Antimony, Asiatic	11.50c.
Babbitt metal, medium grade.....	15.25c.
Babbitt metal, high grade.....	35.00c.
Solder, ½ and ½	19.50c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses. (Prices quoted are nominal. Holders of metal are generally unwilling to part with stock at present low levels.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	8.25c.	9.00c.
Copper, hvy. and wire	8.00c.	8.75c.
Copper, light and bottoms	7.00c.	8.00c.
Brass, heavy.....	4.75c.	5.75c.
Brass, light.....	3.75c.	5.00c.
Hvy. machine composition	7.00c.	8.00c.
No. 1 yel. brass turnings	5.00c.	5.75c.
No. 1 red brass or compos. turnings...	6.50c.	7.50c.
Lead, heavy	3.75c.	4.25c.
Lead, tea	2.50c.	3.00c.
Zinc	2.25c.	2.75c.
Sheet aluminum.....	7.50c.	9.50c.
Cast aluminum.....	7.00c.	8.75c.

about 39,065 tons. Sales were fairly large, at 7050 tons.

Antimony

Chinese metal in a dull market is a little higher at 7.37½c., duty paid, New York, for all positions.

Non-Ferrous Metals at Chicago

CHICAGO, Oct. 21.—Sales of non-ferrous metals are heavier and prices, with the exception of zinc, are stronger. Tin quotations have made a sharp gain over the low of a week

ago. The old metal market is quiet.

Prices per lb. in carload lots: Lake copper, 10.12½c.; tin, 27.75c.; lead, 5.05c.; zinc, 4.05c.; in less-than-carload lots, antimony, 8.50c. On old metals we quote copper wire, crucible shapes and copper clips, 7.50c.; copper bottoms, 6.50c. to 7c.; red brass, 6.50c. to 7c.; yellow brass, 4.50c. to 5c.; lead pipe, 3.75c. to 4c.; zinc, 1.50c. to 1.75c.; pewter, No. 1, 15c.; tin-foil, 16c.; block tin, 22c.; aluminum, 6.50c. to 7c.; all being dealers' prices for less-than-carload lots.

Merger Battle in Final Phase

Arguments Being Presented by Both Sides in Youngstown-Bethlehem Controversy

ARGUMENTS are being presented this week in the final phase of the court battle over the merger of the Youngstown Sheet & Tube Co. with the Bethlehem Steel Corp. Judge David G. Jenkins of the Common Pleas Court at Youngstown is hearing these arguments, and is expected to render his decision in the case within a month or two.

The length of time that will be required for the presentation of arguments by counsel for both sides is indefinite, but it probably will be early next week before the case is finally presented to the court for consideration and decision.

The brief presented by the plaintiffs listed several underlying issues, which, it said, the court must consider in reaching a decision. These were: Whether there was fraud and breach of duty on the part of the officers and directors of Sheet & Tube; whether there was fraud and concealment of facts on the part of Bethlehem and adverse interests of Sheet & Tube; whether the terms are inadequate and unfair so as to constitute a fraud on Sheet & Tube and its shareholders; whether the contract was authorized in compliance with the corporation code; whether the contract is invalid by reason of the illegality of certain provisions and whether the plaintiffs have adequate remedy at law.

The defense brief listed eight propositions in support of its case. It contended among other things that the allegations of fraud have not been sustained; that the alleged inadequacy of the terms is an essential element and the burden of proof is on the plaintiffs; that the plaintiffs failed to establish this proof, whereas the record establishes the fairness of the contract and the adequacy of the terms; that the sale may not be enjoined unless fraud on the part of Bethlehem is proved; that the supplemental petition alleging fraud against Bethlehem should not be permitted because it seeks to bring a new cause

of action; that the votes of Sheet & Tube shareholders were correctly counted and reported by the inspectors.

Harrington Emerson Is Honored by Engineers

VIGOROUS at the age of 77, Harrington Emerson, New York, a pioneer in the efficiency movement, was an outstanding figure at the seventeenth national convention of the Society of Industrial Engineers in Washington, Oct. 15-17. When he spoke at the annual dinner, given as a testimonial to his long career of achievements in his broad field throughout the world, this noted engineer and educator disclosed clearly that he is still adventuring actively as an industrial counselor to governments and private corporations abroad and in the United States. His life is a romance that extends from the laying of town-sites on the Western frontier to the installation of efficiency systems in industry in many parts of the globe.

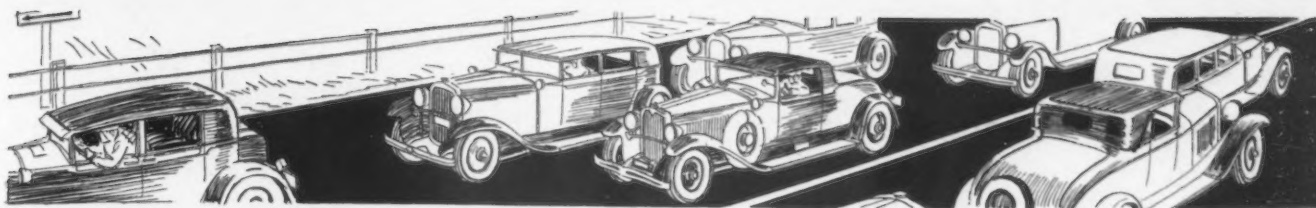
He was born in Trenton, N. J., Aug. 2, 1853. At the age of 9, he went with his parents, the Rev. and Mrs. Edwin Emerson, to Europe to follow an educational plan they had arranged. He was educated in the Royal Bavarian Polytechnic, 1872 to 1875, taking a course in mathematics, and in universities in Italy and Greece, 1875 to 1876. Returning to the United States when 23 years of age, Mr. Emerson was elected professor of modern languages of the University of Nebraska, and served in that capacity from 1876 to 1882. Upon leaving the University of Nebraska, Mr. Emerson entered the service of the Chicago, Burlington & Quincy Railroad in connection with its land and township settlement activities along the frontier in Kansas and Nebraska, where thousands were trekking the prairie section and establishing homes. Next he was made

United States representative of a British syndicate and examined many industrial plants in the United States, Mexico and Canada, serving from 1896 to 1898. Then came the Klondike gold rush and Mr. Emerson opened the first year-round mail route from Juneau to St. Michaels, Alaska. He reported on all known coal deposits of the North American Western coast and on the northern cable route to Asia, which was largely followed by the War Department in laying its Alaska cable. He began life as an engineering counselor in 1901, and the first laboratory in which he founded his principles and philosophies was in a glass works. The first outstanding application of his principles came 27 years ago in connection with the reorganization of the Atchison, Topeka & Santa Fe Railway system. In that job, Mr. Emerson began to "multiply" himself, that is, brought into association with himself men whom he trained in his principles. Many of his original group are well known in industry.

After reorganizing the Santa Fe system, Mr. Emerson came east with six men and became associated with the Baldwin Locomotive Works. During the period, 1900 to 1923, he was president of the Emerson Engineers. In recent years he has been engaged as engineering and industrial counselor to corporations and governments abroad. At present he is preparing a report on unemployment for bureaus of France and Germany. He has also been called into consultation by the Czechoslovak and Polish governments and is adviser to the Ministry of Railways of the Nationalist Government of China. Likewise he is advising a bureau of the Soviet Government in Russia on the principles and fundamentals of Continental travel and operations. He is planning to go abroad soon to visit the governments for which he is counselor. Mr. Emerson is author of "Efficiency as a Basis for Operations and Wages" and "The Twelve Principles of Efficiency." He helped to found the Society of Industrial Engineers and is a national director of the organization.

Foundrymen and Engineers Hold Joint Meeting

The first fall meeting of the Newark Foundrymen's Association was held Wednesday evening, Oct. 22, at the Down Town Club. The metropolitan section of the American Society of Mechanical Engineers united with the foundrymen and there were two principal speakers. E. T. Bennington, manager, Cleveland Tramrail Division of Cleveland Crane Engineering Co., Wickliffe, Ohio, spoke on "Material Handling in the Foundry," and John Tirrell, general foreman, Warren Foundry & Pipe Co., Phillipsburg, N. J., took as his subject, "Casting the Largest Pipes that Have Ever Been Made."



Motor Car Manufacturers Curtailing Production as Sales Decline

DETROIT, Oct. 20. WITH retail sales falling off perceptibly, automobile manufacturers are finding it desirable to curtail production. They have exerted strenuous efforts all of this year to work off surplus stocks which had accumulated last fall and have been successful in carrying out this program. Just now they are eager to guard against dissipating those gains and thereby entering the new year in much the same position as they approached 1930.

That Ford's output in October will be less than in September is the expectation of the industry. The operating rate of the Ford company is guarded closely so that authentic figures are available only once a month; therefore predictions of the actual number of units produced are hazardous at best and generally wide of the mark. One can conservatively say, however, that the maximum will be 90,000 units, with the probability that the total will be considerably under that amount.

Chevrolet Slow in Getting Started

Detroit has been looking to Chevrolet to provide some impetus to an otherwise lagging production schedule for the industry, but assemblies of the new model have not got under way as rapidly as anticipated. The Chevrolet foundry at Saginaw, Mich., and the gear and axle and the forge plants in this city are reported to be very busy. The Fisher body factories supplying the Chevrolet company also have an encouraging program ahead. However, the late start on the new model means that the October volume will fall short of the 50,000 to 60,000 which originally was said to be the goal. It now is doubtful whether the month's total will be 40,000. This must not be interpreted as a downward revision of schedules, but only as a delay. The November rate should be high. It is understood that the new Chevrolet is to be unveiled to the public some time after Nov. 15.

Decrease in automobile production will result in October's performance being rated substantially below September's.

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Chevrolet slow in getting assembly of new models under way; consequently output this month is likely to be less than 40,000 cars.

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Ford has scrapped over 30,000 cars in its salvaging program at the Rouge plant.

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General Motors' September sales show further reduction of dealers' stocks.

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Despite low prices of raw materials, automobile industry is reluctant to indulge in forward buying.

Aside from Ford and Chevrolet, the industry presents a somewhat depressing spectacle. Buick, Reo, Nash, Packard and Cadillac show a fair amount of activity. On the other hand, all of the Chrysler divisions and Oakland-Pontiac, Hudson-Essex, Oldsmobile-Viking and Hupmobile are doing little. In some cases production, as measured by finished cars coming off the assembly lines, has virtually halted. Studebaker's output has dipped considerably and Lincoln is confining its work to specially-built jobs.

October Will Show Decline

UNDER the circumstances it is likely that October's performance will be rated substantially below September's. The industry is taking for granted that the number of units turned out this month will not touch the 200,000 mark.

Despite low prices for raw materials, including iron and steel, automobile companies are not buying

ahead. Chevrolet's purchase of pig iron for its Saginaw foundry is a conspicuous exception. Moreover, this policy is regulated by the desire to get large stocks in by water before the Lake navigation season closes, as the company is said to save \$1 to \$2 a ton by this method as compared with all-rail shipment. Other automobile foundries are taking iron only as they need it and their yard stocks have been pared down almost to nothing. This condition applies also to foundries in other industries. One who is familiar with the present situation states that if a canvass were made of all of the pig iron users in Michigan it would reveal an average of perhaps a week's supply or less. This is regarded as an exceptionally healthy state and is in sharp contrast with 1921. At that time it took some automobile foundries three to four months to deplete surplus stocks when the upturn came. At this time, however, an improvement would be reflected instantly in demand for quick delivery of pig iron.

In connection with the reluctance to buy, even at today's low quotations, there is an interesting story about an automobile company outside of Detroit. It is understood that orders have been issued by the management not to make purchases of raw material, unless necessary for current requirements, until after the turn of the year. The company wants to make as good a financial showing as possible and does not want sizable inventories to appear on the balance sheet, even if it were good business to build up such inventories. In order to achieve its purpose the management is gambling that prices on all forms of raw materials will not advance in the next two months.

Oakland-Pontiac Line to Be Continued

WITH the change in management of Oakland Motor Car Co., by which I. J. Reuter, vice-president of General Motors, becomes general manager, there is assurance that the present Oakland and Pontiac cars

will be continued substantially as they now exist, "injecting into their design and manufacture such improvements as may be possible from time to time." Such is the announcement from the offices of General Motors Corp. Oakland's production has been stepped up from less than 50,000 in 1925 to more than 200,000 in 1929. This announcement dispels the talk which has been going the rounds for some time that either the Oakland or the Pontiac would soon be dropped by General Motors. Following closely on the statement from Cadillac that the present line of Cadillacs and LaSalle's will be continued, General Motors apparently is combatting the bad effect of reports about the dropping of certain cars by openly denying such intentions.

September sales of General Motors to consumers were 75,850 units, compared with 124,723 in the same month of 1929. Sales to dealers totaled 69,901, against 127,220 in September, 1929. While this shows a seasonal downward trend, nevertheless the figures confirm the policy of the industry in further liquidating dealers' stocks, which are from 250,000 to 300,000 units less than at the beginning of the year.

Reports persist that a 12-cylinder, front-drive car will soon be offered by an American maker. The car is said to have a European antecedent and it is also stated that negotiations now are being closed with the European owner of patent rights for production in this country. In it aluminum would be used more exten-

sively than in other cars, thereby reducing the weight about 1200 lb.

At a time when automobile prices are settling to new low levels, Detroit is surprised to learn of an increase of \$20 in the bantam Austin coupe to \$465, f.o.b. Butler, Pa. The present model will be supplemented shortly by a bantam sport roadster priced at \$445.

PUBLICATION of car registrations for this year reveals some interesting facts. Buick has jumped from sixth position in 1929 to third, regaining the place it held for so many years as next in volume to Ford and Chevrolet. Despite the relatively poor business of Hudson-Essex and Oakland-Pontiac, they have varied little in their standing. Even with production at low ebb, the Chrysler units have held their own and in the case of the Plymouth have made a gain. The biggest change is the Whippet, which fell from fourth to eighteenth position. This accounts for the low production rate of the Willys-Overland Co. Otherwise, the standing of various companies has not varied substantially in the past 12 months.

Ford Salvages 30,000 Cars

It is understood that more than 30,000 old automobiles have been salvaged by the Ford Motor Co. at the Rouge plant since it introduced its scrap reclamation plan this year. The salvage line is reported to be averaging 600 cars and trucks a day from Detroit and vicinity.

Reinforcing Steel

Viaduct in Cincinnati Will Take 4000 Tons

AWARDS of reinforcing steel the past week totaled 5100 tons, compared with 3900 tons a week ago. The largest letting was 1500 tons for a bridge at Knoxville, Tenn. New jobs up for bids will take 7800 tons, of which 4000 tons will be used in a viaduct at Cincinnati. Awards follow:

WALTHAM, MASS., 135 tons, hospital buildings, to Truscon Steel Co.
BROOKLYN, 225 tons, Brooklyn technical high school; placed by Fredburn Construction Corp. with Igoe Brothers.
BROOKLYN, 200 tons, warehouse for Peter F. Reilly's Sons, to E. T. Edwards.
NEW YORK, 100 tons, river house on Hudson River, between Fifty-second and Fifty-third Streets; placed by James Stewart & Co. with National Bridge Works.
NEW YORK, 100 tons, foundations for New York Telegram building; placed by George J. Atwell Foundation Corp. with Concrete Steel Co.
NEW YORK, 400 tons, plant, West Fifty-fourth Street near Eleventh Avenue; awarded by Industrial Engineering Co., to Jones & Laughlin Steel Corp.
PITTSBURGH, 1000 tons, Ardmore Boulevard Bridge, to Fort Pitt Bridge Works.

PITTSBURGH, 500 tons, medical building on Fifth Avenue, to McClintic-Marshall Co.
KNOXVILLE, TENN., 1500 tons, bridge, to Knoxville Iron Works.
CHICAGO, 230 tons, Steinmetz School, to Inland Steel Co.
STATE OF ILLINOIS, 200 tons, road work, to Calumet Steel Co.
LOS ANGELES, 300 tons, warehouse for Brunswick Drug Co., to an unnamed bidder.
LOS ANGELES, 200 tons, newspaper building on Wilcox Street, to an unnamed bidder.
LOS ANGELES, 250 tons, John Marshall School, to an unnamed bidder.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

NEW YORK, 900 tons, foundations for penitentiary, Riker's Island, Department of Correction, New York; C. A. Williams Co., Inc., low bidder on general contract.
BROOKLYN, 500 tons, subway route 107, section 8; Clemente Contracting Co., Bronx, low bidder on general contract.
QUEENS, New York, 1100 tons, subway route 108, section 6; George H. Flinn Corp., New York, low bidder on general contract.
CINCINNATI, 4000 tons, viaduct.
EVANSVILLE, IND., 675 tons, State bridge.
CLEVELAND, 200 tons, John Marshall School.
CHICAGO, 600 tons, apartment building at Seventieth Street and Lake Shore Drive.

WINNETKA, ILL., 100 tons, residence for Max Epstein.
CHICAGO, tonnage being estimated, electrical building for World's Fair.
SEATTLE, 600 tons, Textile Towers; bids being taken.
SEATTLE, 350 tons, garage on Sixth Avenue; bids opened.
SEATTLE, 350 tons, garage on Ninth Avenue; bids being taken.
OAKLAND, CAL., 600 tons, Paramount theater; bids being taken.
BERKELEY, CAL., 350 tons, building for University of California; bids opened.

Railroad Equipment

Baltimore & Ohio to Build 2000 Freight Cars

THE Baltimore & Ohio Railroad has announced that it will build 1000 gondola cars and 1000 box cars in its own shops. A contract for bodies for the 1000 box cars has been awarded to the Standard Steel Car Co. This is the largest railroad car-building project in some time. Other items of the week follow:

Western Fruit Express has revived an inquiry for 100 underframes.

Anglo-Chilean Consolidated Nitrate Corp. has ordered 50 air-dump cars from Magor Car Corp.

Duluth, Missabe & Northern is inquiring for three locomotive tenders.

Indiana Service Corporation, Fort Wayne, is inquiring for 25 interurban cars.

Chicago & Illinois Midland is in the market for four 2-10-2 and one 2-8-2 type locomotives.

Sheet Sales Gained, But Shipments Fell Off

The spurt of sheet steel buying in September is reflected in the report of the National Association of Flat Rolled Steel Manufacturers, which showed a gain of 43 per cent in sheet sales last month over August, the report being based on returns from independent mills. Sales in September were 214,454 net tons, compared with 148,969 tons in August, and were the largest for any month since April. However, shipments, which gained slightly in August, fell off nearly 20 per cent in September and were the lowest since December, 1929. Shipments were 186,639 tons, compared with 205,774 tons during the previous month. Production gained slightly over August and unfilled orders on Oct. 1 showed some increase. The September report and comparisons in net tons follow:

	September	August	July
Sales	214,454	148,969	207,400
Production	179,928	173,956	186,206
Shipments	186,639	205,774	194,767
Unfilled orders	388,599	373,148	432,298
Unshipped orders	97,428	99,925	119,974
Unsold stocks	88,363	82,315	82,708
Capacity per month	545,200	529,600	546,500
Percentage reporting ..	67.6	67.6	67.6
Percentages, Based on Capacity			
Sales	58.2	41.6	56.2
Production	48.8	48.6	50.4
Shipments	50.7	57.5	52.7
Unfilled orders	105.5	104.3	117.0
Unshipped orders	26.4	27.9	32.5
Unsold stocks	24.0	23.0	22.4

Condemns Direct Mill Sales

President Concrete Reinforcing Steel Institute Points
to Price Demoralization as Result

CONCRETE reinforcing bar distributors are seriously hampered in their efforts to maintain market stabilization by direct mill competition, according to C. Louis Meyer, president, Concrete Reinforcing Steel Institute, which opened its semi-annual meeting at Briarcliff Lodge, New York, on Oct. 20. Mr. Meyer, who is president of the Concrete Engineering Co., Omaha, Neb., described direct mill competition as the distributor's most serious problem.

"Stabilization of bar markets," he said, "has been fairly well accomplished in those localities where the competitive influences are confined to the reinforcing bar fabricators. The greatest difficulty has been encountered in those centers where mills have adopted policies of direct sale. Fortunately, most of the mills have refrained from selling direct to the trade. However, there have been enough of the mills pursuing this direct sales policy to aggravate the competitive situation in many localities. In their endeavor to get tonnage by selling direct to the trade, they have taken the business away from fabricators and bar companies, many of whom have been their regular customers.

"This competition has resulted in lower prices, which in turn have resulted in lower mill prices, for just as surely as the sun rises and sets each day, a disrupted retail market brings about a disrupted mill market. The final result of this competition has been that these mills have defeated their very purpose, for both the price of the goods which they have sold at retail as well as that sold at wholesale has declined to unattractive levels. In some cases this competition has come from manufacturers of new billet steel, but more often from manufacturers of rail steel."

Suggests Elimination of Direct Sales

Mr. Meyer said that in his judgment the solution of this problem is the elimination of direct mill sales. He estimated that not more than 20 per cent of the total reinforcing bar tonnage of the country is sold direct by the mills. The remaining 80 per cent is being sold by reinforcing bar fabricators and jobbers. He said that the problem of competition of the manufacturers of rail steel bars is more complicated than that for the manufacturers of billet steel bars, but he offered the same solution in both cases.

"The rail steel bar mills," he said, "have established the custom of selling their products rolled from old rails at a lower price than new billet steel bars. It is perhaps more logical that their products should be sold

at a lower price than new billet steel, but it is not logical that this price differential should be different on every sale. It has varied as much as \$10 a ton in the same place at the same time. It would be beneficial to both producer and user to establish a definite differential between the billet steel grade and the rail steel grade. This differential should be established at a figure which clearly indicates the difference in quality between the two materials.

"If the manufacturers of rail steel bars will serve as producers only, and will discontinue the direct sale of their product to the trade, this tonnage will naturally be sold by the bar companies. This additional tonnage will relieve the competitive condition between fabricators and will permit a stabilized market. As in the case of billet steel, a firm retail market promotes a firm mill market.

"The manufacturers of rail steel bars may feel that their product requires individual promotion as opposed to new billet bars. In my judgment this promotional work may quite logically be continued by the mills without including the direct sale of the product."

He urged the institute to outline a definite appeal to the mills to discontinue direct selling.

Urges Market Extension Work

Mr. Meyer urged that the Concrete Reinforcing Steel Institute concentrate its activities on market extension and market stabilization. He suggested that the institute proceed with the publication of a booklet on the erection of tall buildings of reinforced concrete. He said that the column tests which are being conducted in cooperation with the Portland Cement Association and the Rail Steel Bar Association, when completed, will offer conclusive evidence in favor of a substantial increase in working stresses in reinforced concrete columns. This, he said, should open up a large field for the use of reinforced concrete frames in tall buildings, thus substantially increasing the use of reinforcing steel.

"Competing industries," said Mr. Meyer, "are very aggressive in their efforts to substitute other materials for reinforced concrete. To maintain our position in the construction industry and to expand the use of reinforcing steel demands constant promotional effort and advertising propaganda."

In connection with the advertising work, he recommended the use of quality marking. "In my judgment," he said, "the use of a quality mark, with an adequate advertising campaign carried on by the institute, will

not only increase volume but will afford a means of market stabilization."

Business Improving Slowly

Referring to business conditions, he said that business is improving slowly but surely. The decline in sales of reinforcing bars this year as compared with last year has been negligible, the first eight months having shown a drop of only 5 per cent from the same period of last year, while shipments during the same period showed an actual increase of 2 per cent.

"With a continuation of the large programs of paving work, bridges, and public works during next year, and with an improvement in building work which we may logically expect, we may look into the future with a firm conviction that business will be improved. We may proceed with confidence and optimism. There has been too much fear, too much hesitancy, too much caution. It is time to act the part of optimism; it is time to talk optimism."

Empire Steel Corp. is Being Reorganized

Empire Steel Corp., Mansfield, Ohio, is in process of reorganization under the direction of Pickands, Mather & Co., Cleveland, whose present interest in the corporation probably will be materially enlarged. Pickands, Mather & Co., under the present organization, has one representative on the board of directors. No new financing is contemplated. W. H. Davey recently retired as president of the Empire corporation, but is still chairman of the board of directors. The Empire corporation is an important outlet for pig iron for Pickands, Mather & Co., as that firm supplies from its Toledo furnaces the pig iron used in the Empire steel plant at Mansfield.

The Empire Steel Corp., organized in December, 1927, by W. H. Davey, then president of the Mansfield Sheet & Tin Plate Co., effected a merger of six Ohio sheet mills, those of the Mansfield company, Empire Steel Co., Cleveland; Ashtabula Sheet Steel Co., Ashtabula, Ohio; and the Falcon Steel Co., Thomas Steel Co. and Waddell Steel Co. of Niles. The Cleveland and Ashtabula plants have been shut down for some time and the Niles plants have been operating intermittently.

Gulf States to Increase Open-Hearth Capacity

The Gulf States Steel Co., Birmingham, is to increase the capacity of three of its open-hearth furnaces from 100 tons to 125 tons each. All six open-hearths of this company were recently rebuilt to increase their capacity from 75 tons to 100 tons each.

▲ ▲ ▲ OBITUARY ▲ ▲ ▲

PHILIP HARDING PATRIARCHE, vice-president and a founder of Patriarche & Bell, steel merchants, New York, died after a long illness at his home in Orange, N. J., on Oct. 17, aged 79 years. He was born on the Isle of Jersey, Great Britain, and was educated at the Leeds Grammar School, England. He came to this country in 1874 and settled in St. Louis. He later traveled in the far West for Miller, Metcalf & Parkin and afterward was their representative in New York. About 1900 he organized, with the late Park Bell, the firm of Patriarche & Bell, which he served actively until nearly 18 months ago.

WALTER A. HEATH, assistant general superintendent of the Universal Atlas Cement Co., Buffington, Ind., died Oct. 5. He had been associated with the cement company for 25 years.

WILLIAM L. HOLLIS, president, Louisville Tin & Stove Co., Louisville, Ky., died Oct. 8, following an illness of five months.

MERRILL HUBBARD, president, Middle States Construction Co., Columbus, Ohio, and for a number of years chief engineer of the Jeffrey Mfg. Co., Columbus, died in that city on Oct. 16, aged 54 years.

HERBERT H. DOW, president, Dow Chemical Co., Midland, Mich., died Oct. 15, aged 64 years. A graduate of Case School of Applied Science in 1888, he founded the Midland Chemical Co. in 1890, which later became the Dow company. He served for several years as consultant for the Westinghouse Electric & Mfg. Co. In 1917 he was appointed a member of the advisory committee of the Council for National Defense.

JOHN KENT MORRIS, president, Atwell Steel Products Co., New York, died suddenly while driving in an automobile from Staunton, Va., to New York on Oct. 17, aged 47 years.

ROBERT B. BRANDL, who had been identified for 28 years with the Saint Paul Corrugating Co., Saint Paul, Minn., died at a hospital in that city on Oct. 14, following an operation. He was 45 years old.

HARDING G. ALLEN, proprietor of Charles G. Allen Co., Barre, Mass., died at his home at that city on Oct. 11 after a week's illness.

DAVID WILSON HUNT, formerly president of the Moline Tool Co., Moline, Ill., died at his home in that city on Oct. 18, aged 91 years.

FRANK BAACKES, assistant to the president, American Steel & Wire Co., died on Oct. 18, following an illness of several months. Early last June he suffered a shock from which he never fully recovered when he fell down steps at his summer home. For more than half a century Mr. Baackes had



Frank Baackes

been engaged in the manufacture of wire products, principally nails. He was born at Saint Toenis, Germany, March 9, 1863, and went to work at 16 in the wire nail mills at Obermilk-Düsseldorf. Shortly after, he came to the United States and became identified with a nail factory in Cleveland. He was made superintendent of this plant in 1881. Four years later he is said to have introduced the standard wire nail, which had previously been little used in this country, organizing the Salem Wire Nail Co., Salem, Ohio. He remained as general manager of this plant until its absorption in 1898 by the American Steel & Wire Co. of Illinois, in which he assumed the same position. He became superintendent of the American Steel & Wire Co. of New Jersey, when it took over the earlier company of largely similar name. He was appointed general sales agent and elected a director in 1900 and was made vice-president in 1905. He served in that capacity until last May, when he became assistant to the president.

PEIRCE D. SCHENCK, president of the Duriron Co., Dayton, Ohio, died of pneumonia, following a long illness, at his home in that city on Oct. 15, aged 52 years. He received his schooling at Phillips-Andover Academy and at Sheffield Scientific School of Yale University. Upon leaving college, he became identified with the

Dayton street railways for about two years, after which he became vice-president and later president of the Dayton Malleable Iron Co. In 1915 he helped organize the Duriron Co. and became its president. He was responsible for the development of many of the processes in the making of Duriron and was considered an expert on non-corrosive metals.

Steel Castings Business Off in September

WASHINGTON, Oct. 21.—Orders for commercial steel castings in September totaled 49,618 net tons, or 34 per cent of the capacity of the principal manufacturers, according to the Department of Commerce. The output in August was 50,516 tons, or 35 per cent of capacity. The production in September was 62,017 tons, or 43 per cent of capacity, against 64,449 tons, or 45 per cent of capacity, in August.

Fabricated Steel Orders Decline in September

WASHINGTON, Oct. 21.—Orders for fabricated structural steel in September reported to the Department of Commerce totaled 136,558 tons, or 42 per cent of capacity, against reported orders of 220,587 tons, or 66 per cent of capacity, in August.

Computed bookings in September were 168,000 tons, against 264,000 tons in August. Computed shipments were 260,000 and 280,000 tons respectively.

Fore River Shipyard to Build \$7,200,000 Ship

WASHINGTON, Oct. 21.—The Fore River plant of the Bethlehem Shipbuilding Corp. at Quincy, Mass., has been awarded a contract to build a passenger-cargo ship of approximately 11,300 deadweight tons for the Oceanic Steamship Co., San Francisco. The vessel will cost \$7,200,000 and will be identical with two other ships being built at the Fore River plant. The Oceanic company has been granted a loan by the Shipping Board of not to exceed \$5,887,500, covering three-fourths of the construction cost of the ship.

Members of the Electric Hoist Manufacturers' Association report that the number of hoists ordered during September decreased 10.9 per cent as compared with the previous month, and the value of such orders increased 13.6 per cent as compared with August. Shipments were 13.8 per cent smaller in September than in August.

PERSONALS

DR. D. J. MCADAM, JR., of the Naval Engineering Experiment Station, Annapolis, Md., has been appointed by Dr. G. BURGESS, director of the Bureau of Standards, as chief of the section on metallography in the bureau's division of metallurgy. Dr. McAdam is well known in metallurgical circles, both in America and abroad, for the important pioneer work he has carried out on the effect of corrosion on the fatigue of metals. The award of the first Dudley medal was made to him in 1927 by the American Society for Testing Materials. Dr. McAdam was born at Washington, Pa., in 1877. He was educated at Washington and Jefferson College and did post-graduate work in chemistry at Harvard and at the University of Pennsylvania, where he received his Ph.D. degree in chemistry. After serving as instructor at Lehigh University from 1907 to 1910, Dr. McAdam entered the Government service, where he was employed as scientist in soil laboratory investigations, Department of Agriculture. From 1913 to the present time he has been metallurgist at the Naval Experiment station.

DANIEL C. JACKLING will be the guest of honor at a dinner at the Ritz Carlton Hotel, New York, on Oct. 31, given by the board of directors of the American Institute of Mining and Metallurgical Engineers. He will be presented with the William Lawrence Saunders gold medal for achievement in mining.

DON L. BROWN, vice-president in charge of manufacturing of the Pratt & Whitney Aircraft Co., Hartford, Conn., has been elected president, to succeed F. B. RENTSCHLER, who has become chairman, a newly-created office.

LOGAN T. JOHNSTON, formerly with the Standard Steel Car Co., Pittsburgh, and more recently assistant to the vice-president in charge of the commercial activities of the forged steel wheel division of the American Rolling Mill Co., Middletown, Ohio, has been appointed manager of a newly-organized railroad sales division of the latter company. H. M. ARRICK, who was with the Pennsylvania Railroad before joining the American Rolling Mill Co. three years ago, has been made assistant manager of this division. C. G. BACON has been appointed director of wheel research. The American Rolling Mill Co.'s new railroad division will have three distinct sales offices. W. B. QUAIL will be in charge in New York, assisted by W. A. DIBBLEE and E. C. BRAY. The

latter will spend most of his time in the company's Philadelphia office. ERNEST BAXTER will be manager in the Chicago district and will continue also as vice-president of the Sheffield Steel Corp., in charge of its railroad sales. F. E. FINLEY has been made manager in St. Louis.

K. W. ATKINS, who for the past three years has been general manager of the Southwestern territory for E. C. Atkins & Co., Indianapolis, Ind., has been transferred to the home office at Indianapolis as assistant sales director. CHARLES S. HAGGARTY, who has been manager of the Atkins branch at New Orleans for more than 20 years, has been promoted to supervisor of saw mill and factory trade in the New Orleans and Memphis territory. The Memphis office will continue to be in charge of JAMES W. GLADDING, and the Atlanta branch will be in charge of C. J. HENDRYX, who has become supervisor of sales to the hardware and mill supply trade in the South.

FRANK R. PALMER, technical assistant to the president of the Carpenter Steel Co., Reading, Pa., will address the regular monthly meeting of the New Haven chapter of the American Society for Steel Treating on Oct. 25 in the auditorium of the Bristol Co., Waterbury, Conn., on "Corrosion-Resistant Steels."

C. H. LONGFIELD has been elected vice-president and H. H. WINTERBERG secretary of the Lamson & Sessions Co., Cleveland, and H. P. LADDS has been appointed manager of sales.

JOSEPH LEDWINKA, chief engineer, Edward G. Budd Mfg. Co., Philadelphia, has returned from England, where he visited the Pressed Steel Co. of Great Britain, which is affiliated with the Budd organization.

C. F. NIEMANN, president, Parkersburg Iron & Steel Co., Parkersburg, W. Va., has been elected a vice-president of the Colonial Trust Co., Pittsburgh.

J. T. CONNERS, who has been for a number of years Detroit district manager for the Thew Shovel Co., has become identified with the American Hoist & Derrick Co., St. Paul, Minn., in charge of sales in the field of Gopher shovel cranes.

ALBERT C. LEHMAN, president, Blaw-Knox Co., Pittsburgh, has been made a director of the Union National Bank in that city.

E. L. MILLS, sales manager, Bastain-Blessing Co., has been elected president of the Gas Products Association, Chicago. Other officers are A. J. FAUSEK, Modern Engineering Co., and W. H. BALLANCE, Electrox Co., first and second vice-presidents, respectively. E. J. FLOOD, Page Steel & Wire Co., is commissioner.

E. S. BLACK, formerly assistant to the president of the American Manganeese Steel Co., Chicago, has been appointed research engineer of the Pettibone Mulliken Co., Chicago.

W. S. STEWART, who has been in charge of the Pacific Coast offices of the Lincoln Electric Co., Cleveland, has been made district manager in charge of the Cleveland territory, with offices at the factory, Coit Road and Kirby Avenue. He has been identified with the company since his graduation from Yale University.

E. L. REED, formerly an instructor in metallurgy in Harvard University and at present research metallurgist in the research laboratory of the American Sheet & Tin Plate Co., Pittsburgh, was awarded the degree of Doctor of Science in metallurgy by Harvard last June.

W. L. KRUG, former superintendent of the McCormick malleable iron foundry of the International Harvester Co., has been appointed superintendent of the malleable iron foundry at Joliet, Ill., of the William E. Pratt Mfg. Co. He succeeds the late James Beaman, who held that position for 32 years.

CLINTON A. BALDWIN, who has served the Savage Arms Corporation, Utica, N. Y., in various capacities for the past 19 years, has been named works manager to succeed Fred T. Russell, who was killed in an automobile accident recently.

FRANK P. CUMMERFORD on Oct. 3 completed 61 years of service with the Pusey & Jones Corporation, Wilmington, Del. He has operated the same metal-planing machine for more than 55 years.

JAMES E. MACMURRAY, chairman of the board, Acme Steel Co., Chicago, has been honored by the Illinois Women's College, which has changed its name to MacMurray College for Women, in recognition of his gift of a science building, a dormitory and a commons building.

Machine Tool Business Gained in September

Report of National
Machine Tool Builders'
Association Shows Slight Rise

ORDERS for machine tools gained more than 18 per cent in September over August, following an increase of almost 25 per cent in that month over July, according to the monthly index of the National Machine Tool Builders' Association. The index figure for September sales was 135.9, as against 113.8 in August and 91.1 in July.

Opinion in the trade varies as to the showing that October will make. Some machine tool builders report that their

sales this month are gaining slightly over the September rate, but dealers in important districts see no improvement this month. One large machinery company states that its sales began to decline late in September. This condition is ascribed in some quarters to renewed caution on the part of buyers, brought about by the fresh decline in the stock market.

Shipments of machine tools fell off in September, though orders were increasing. The index figure for ship-

ments of the tool builders' association is 96.4, compared with 119.6 for August and 128.1 for July. Unfilled orders were higher at the end of September at 267.5, compared with 222.6 at the end of August and 235.3 at the end of July.

Current business is generally reported as dull. Orders are mostly for single tools. In most sections of the country there are no clearly discernible signs of marked improvement during the remainder of the year.

New York

Although reports received by the local machine tool trade from some of the machine tool builders indicate that October business in the country as a whole is showing a slight gain over that of September, this apparently does not hold true in the New York district, where the renewed caution engendered by the fresh decline in the stock market may act as a more important deterrent than in other districts farther removed from Wall Street influence. It is not certain that the slowness of business this month can be attributed to the situation in the securities markets, but it is noteworthy that one large company reports that its sales were showing a small but steady increase until fresh weakness developed in stocks.

Chicago

The local machine tool market continues at about the same level as earlier in the month. Majestic Household Utilities Corp., Chicago, is still purchasing against an old list, but otherwise buyers are confining their interest to single tools. The list of pending business remains large, but, as the year advances and there are no outstanding factors pointing to better trade conditions, buyers seem less inclined to purchase the machines which their inquiries indicate they could use. Business with jobbing shops is spotty, some operating at substantial rates having gained in output lately, while others find order books slowly shrinking. Movement of used tools is comparatively good, and available equipment of this kind is more plentiful. Although radio parts manufacturers find business spotty their operations on the whole are up.

Cleveland

The machinery market continues unusually dull and with no signs of improvement. Sales the past week were limited to single machines and these orders were scarce. In previous years the motor car industry in the Detroit territory has bought considerable equipment during the fall, but very few orders are coming from this source and these are seldom for more than one or two machines, although a purchase of several tools is reported to have been made by the Reo Motor Car Co., Lansing.

Pittsburgh

Local machinery dealers are beginning to interest themselves in 1931 requirements of the larger industrial buyers in the district. While a fair volume of business now pending is likely to be closed before the end of the year, most of it represents single tools or small orders and new inquiry coming out is mostly of the same nature. Some business is certain to develop from the extensive sales missionary work being carried on, but such orders are slow in closing. A recent buyer of considerable new equipment and tools is the St. Joseph Lead Co., which is erecting a new plant on the Ohio River near Monaca, Pa. Such orders have largely been placed through United Engineers & Constructors, Inc., Philadelphia, general contractor.

The Westinghouse Electric & Mfg. Co., East Pittsburgh, promises to be a large buyer next year and is expected to issue a list covering its major requirements within the next month. The company canceled its former inquiries, which had not yet been acted

upon, a short time ago and the new list will contain items originally intended as part of the 1930 buying program. Steel fabricating shops in this district also plan rather heavy tool expenditures next year. The policy of the railroads is still something of an enigma, although dealers feel confident that the light purchases of the last two years must certainly be followed by increased activity before another year has passed.

Milwaukee

Some disappointment is expressed in the machine tool trade relative to current business; new orders are not developing at the rate previously expected. At the same time, there has been no recession from the slightly higher level reached late in September and carried through thus far in October. Virtually all business is for replacement, and instances of plant expansion are rare. Inquiries are numerous, but there is much hesitancy on the part of buyers to act upon quotations. The A. O. Smith Corp. continues to make purchases for its new shop, 225 x 242 ft., and 100 ft. high, and has placed an order for three cranes with the Harnischfeger Corp.

Cincinnati

Except for occasional single orders, there is little demand for machine tools. Inquiries continue fair, but buyers still defer closing after receiving quotations. Production is low. Some companies have reduced forces further the past week and all plants are curtailing working hours in keeping with demand.

New York

BIDS will soon be asked by Board of Education, Park Avenue and Fifty-ninth Street, New York, for Bronx continuation school, to include complete manual training shops, to cost \$1,100,000 with equipment. W. C. Martin, Flatbush Avenue Extension and Concord Street, Brooklyn, is architect for board.

Long Island Lighting Co., 50 Church Street, New York, is considering rebuilding part of equipment storage and distributing plant at Northport, L. I., recently damaged by fire, to cost over \$70,000 with equipment.

R-K-O Radio Pictures Corp., 1560 Broadway, New York, plans film laboratory near present studios at Hollywood, Cal., to cost over \$850,000 with equipment.

Wheels, Inc., 630 West Fifty-second Street, New York, operating an automobile and airplane repair works, has leased property 100 x 100 ft., at Eleventh Avenue and Fifty-fourth Street, for expansion. John L. Creamer is president.

William I. Hohauser, Inc., 17 West Forty-fourth Street, New York, architect and engineer, has plans for a two-story automobile service, repair and garage building, 125 x 195 ft., at Long Island City, to cost over \$100,000 with equipment.

New York Steam Corp., 280 Madison Avenue, New York, operating steam power plants for central heating, is arranging for increase in capital from 30,000 to 500,000 shares of stock, and for sale of new shares in amount of \$6,000,000, part of fund to be used for expansion and improvements.

Ellis & Ellis, White Plains, N. Y., have plans for a three-story automobile ser-

vice, repair and garage building, 50 x 175 ft., to cost more than \$100,000 with equipment.

Metropolitan-Eastern Pipe & Nipple Corp., New York, has been organized to take over and consolidate Metropolitan Iron & Nipple Works, 6 Forsyth Street, and Eastern Pipe & Nipple Works, 539 East Seventeenth Street, both manufacturers of iron pipe, nipples and other fittings. Increased production is planned. Samuel Schwedelson and Samuel Luke are principal incorporators.

Westchester Lighting Co., Mount Vernon, N. Y., has superstructure under way on a four-story equipment storage and distributing plant, with repair facilities, automobile service and garage unit at Pleasantville, N. Y., to cost about \$125,000 with equipment.

Westchester County Sanitary Sewer Commission, Court House Annex, White Plains, N. Y., will receive bids until Nov. 7 for a pumping plant with auxiliary structures.

K. & M. Ornamental Iron & Novelties Corp., Brooklyn, care of Samuel and Joseph Korb, 88 Middleton Street, recently organized by men noted, is planning operation of local factory for manufacture of ornamental iron products, tools and kindred products.

Fischer & Dackerman, 1153 Chestnut Street, Elizabeth, N. J., manufacturer of automobile bodies, has asked bids on general contract for a one-story addition, including improvements in present plant, to cost about \$25,000 with equipment. William L. Finne, 1201 East Grand Street, is architect.

National Air Transport, Inc., 420 Lexington Avenue, New York, has filed plans for a one-story hangar with repair facilities at Newark Airport, Newark, to cost \$100,000 with equipment. Company

has removed operating base for mail service to this location from New Brunswick, N. J.

Plans are being arranged for reorganization of Kolster Radio Corp., 200 Mount Pleasant Avenue, Newark. Company has been in receivership since January and has been purchased by S. P. Woodard & Co., 37 Wall Street, New York, investment securities, who will invest \$4,500,000 in defraying obligations and placing plant and equipment on basis for full production.

John C. Kohaut, Inc., 117 Green Street, Newark, operating a wood-working and cabinet plant, has plans for a three-story addition, 50 x 100 ft., to cost about \$40,000 with equipment. Marshall N. Shoemaker, 15 Central Avenue, is architect and engineer.

Philadelphia

BIDS have been asked by Reading Co., Reading Terminal, Philadelphia, for chain of substations in connection with electrification of lines in this district now under way, to cost over \$300,000 with machinery. Clark Dillenback is company engineer.

S. W. Evans & Son, Inc., Philadelphia, has been organized with a capital of \$50,000 to take over and succeed to company of same name, with local plant at 4623 Paul Street, manufacturer of sheet metal goods. Expansion is planned. S. W. Evans, Jr., and Morton E. Evans head company.

Department of Supplies and Purchases, City Hall Annex, Philadelphia, Jay Lit, director, will receive bids until Oct. 31 for castings, class 435; water heater parts, class 431; electric water heaters,

INDUSTRIAL ACTIVITY

Prospects Revealed by a Survey of Construction Projects

THE value of new construction projects requiring machinery and other equipment totals \$73,000,000 this week, compared with \$53,000,000 a week ago and \$68,000,000 two weeks ago. Of this week's total, however, more than \$44,000,000 is represented in bond issues of the Edison Electric Illuminating Co., Boston, Northern Indiana Public Service Co., Hammond, Ind., and other public utilities. Future construction by utilities includes \$1,500,000 for hydroelectric generating plants at Shasta, Cal., to be built by the Pacific Gas & Electric Co., and a \$2,000,000 natural gas line from the Kentucky fields to Detroit, to be laid by the Northern Industrial Gas Co. Both projects are awaiting permits. Municipal electric and gas construction totaling some \$900,000, includes \$400,000 for a gas plant at Fort Worth, Tex.

Construction planned by the oil industry, reaching a total of \$4,500,000, includes a \$2,000,000 pipe line in Texas by the Humble Oil Co. and a \$2,000,000 oil line from Borger, Tex., to St. Louis, projected by the Phillips Petroleum Co.

Industrial construction reaches a total this week

of about \$12,000,000, practically the same as a week ago, and includes a \$2,000,000 assembly plant for the Ford Motor Co. at Dearborn, Mich., a \$1,000,000 terminal and distributing building in Worcester, Mass., \$100,000 for expansion at a coal pulverizing and briquetting plant in West Virginia, \$750,000 for a bakery in Baltimore and \$100,000 for a refrigerating plant in California.

Railroad expenditures, which have been inconsequential in recent weeks, total close to \$4,000,000 and include \$1,550,000 for new classification yards of the New York Central Railroad at Toledo, Ohio, and \$2,200,000 for new coaling piers of the Chesapeake & Ohio Railroad at Newport News, Va.

Vocational schools will cost nearly \$3,000,000, slightly less than last week's total of \$4,000,000. Included among the larger schools is \$1,400,000 for building and manual training equipment in the new Theodore Roosevelt High School in Washington and \$500,000 for a school and equipment at Hammond, Ind. A new chemistry and physics building at the University of Cincinnati will cost \$400,000.

class 432; dust collector, class 430; and utility truck, class 433.

Wheeling Corrugating Co., 1234 Hamilton Street, Philadelphia, with main mill at Wheeling, W. Va., has awarded general contract to E. R. Hall, 34 South Seventeenth Street, for a one and two-story factory branch and distributing plant, 255 x 260 ft., to cost \$110,000 with equipment. Company is a subsidiary of Wheeling Steel Co., Wheeling.

Parchment Paper Co., Lambertville, N. J., has taken over former local mill of Perseverance Paper Co., and will remodel new plant for manufacture of processed papers, including heavy grease-proof stocks.

Department of Institutions and Agencies, State Office Building, Trenton, N. J., is asking bids until Oct. 29 for mechanical stokers and watertube boilers for installation at local State prison. Specifications on file at office of Division of Architecture and Construction, address noted.

Sidney Neville, 6647 North Fairhill Street, Philadelphia, and William H. Baker, 746 Stanbridge Street, Norristown, Pa., have organized Baker & Neville, Inc., and plan operation of local works for manufacture of parts and assembling for machinery, motors, etc. A. K. Althouse, 717 West Marshall Street, Norristown, will be treasurer.

National Roofing Co., Harrisburg, Pa., recently organized, has taken over a building at Cameron and Elliott Streets for plant specializing in new type of roofing products. J. G. Bricker is general manager.

Alexander J. Vaughn has withdrawn from Vaughn Brass Works, Oxford and Hancock Streets, Philadelphia, and plant will be operated in future as an individual enterprise by Jacob Holstein, heretofore a partner with Mr. Vaughn in company.

Tinius Olsen Testing Machine Co., Philadelphia, has awarded contract for a six-story addition for storage and assembling, as well as for an enlarged erecting floor with increased crane way for erection of large testing and balancing machine equipment, to cost \$75,000 with equipment.

DeWalt Products Corp., manufacturer of wood-working machinery, is occupying its new plant at Lancaster, Pa.

Buffalo

PLANS are under way by Invisible Roll Ball Caster Co., Inc., Jamestown, N. Y., recently organized with capital of \$25,000, for local plant for manufacture of a patented roller bearing caster. Company is headed by Thure N. Fagerstrom, 21 Hedges Avenue, and Leo D. Seager, 45 Mount Vernon Place.

Standard Oil Co. of New York, Genesee Building, Buffalo, with main offices at 26 Broadway, New York, has taken option on property at Dunkirk, N. Y., as site for new oil storage and distributing plant, to cost over \$175,000 with equipment.

Officials of Porter-Cable Machine Co., 1708 North Salina Street, Syracuse, N. Y., manufacturer of lathes, disk grinders, band saws, etc., have organized Porter-Cable-Hutchinson Corporation to take over and expand present company. DeAlton J. and Walter A. Ridings head new organization.

Buffalo Distributing Terminals, Inc., Indianapolis, care of Raymond D. Brown,

341 Postal Station Building, Indianapolis, president, recently organized by Mr. Brown and associates, plans construction of new terminal warehouse at Buffalo, to be occupied under lease by Great Atlantic & Pacific Tea Co., 420 Lexington Avenue, New York, with installation of conveying, elevating and other material-handling equipment. Unit will cost over \$300,000 with equipment.

Vacuum Oil Co., 61 Broadway, New York, plans rebuilding part of gasoline refinery at Olean, N. Y., destroyed by fire Oct. 16, with loss of about \$30,000 with equipment.

Board of Water Commissioners, Seneca Falls, N. Y., is disposing of a bond issue of \$22,000, entire fund to be used for purchase of water meters for municipal system.

South Atlantic

CONVEYING, elevating, loading and other equipment will be installed in new storage and distributing plant of Great Atlantic & Pacific Tea Co., 420 Lexington Avenue, New York, at Richmond, Va., to be occupied under lease. General contract has been let to Doyle & Russell, Richmond. It will cost close to \$90,000 with equipment.

Austin Brothers Bridge Co., 1195 Mickleberry Street, Atlanta, Ga., operating a structural steel and iron works, has arranged for purchase of R. C. Lieb Co., manufacturer of ornamental iron products, occupying an adjoining site, and will consolidate. Lieb works will be continued for same line of production as heretofore, with development in output.

Victor Cotton Oil Co., Gaffney, S. C., has plans for a two-story addition, 60 x 100 ft., to cost about \$25,000 with equipment. M. R. Marsh, Builders' Building, Charlotte, N. C., is architect. Part of new unit will be used for storage and distribution.

Board of District Commissioners, District Building, Washington, is considering installation of manual training equipment in new multi-story Theodore Roosevelt High School to cost over \$1,400,000, for which bids are being asked on general contract until Nov. 15; plans and specifications in room 427, District Building. Board is asking bids until Oct. 29, for signal and telephone cable, and laboratory equipment.

Chesapeake & Ohio Railroad Co., Richmond, Va., is considering extensions and improvements in locomotive shops at Clifton Forge, Va., to cost over \$100,000 with equipment. C. W. Johns, Richmond, is chief engineer. Company has work under way on new coaling pier at Newport News, Va., to cost \$2,200,000 with conveying, loading and other equipment.

Richmond Label Machine Co., Richmond, Va., recently organized by B. O. Woodcock, 3610 Decatur Street, and associates, with capital of \$50,000, plans operation of local factory for manufacture of label-printing and stamping machines and parts.

Conveying equipment, motor-driven machinery, etc., will be installed in new plant of Chestnut Farms Dairy, Inc., Baltimore, a subsidiary of National Dairy Products Corp., 120 Broadway, New York, consisting of remodeling and improving former bakery and four-story addition, to cost over \$750,000 with machinery.

Southern Cities Public Service Co., Gas Building, Atlanta, Ga., has purchased

properties of Georgia Natural Gas Co., operating at Rockmart, Cedartown, Carrollton and vicinity. New owner will operate as a unit of organization and plans extensions, including pipe lines for natural gas supply to other districts.

Southern Mineral Products Corp., Amherst, Va., is completing new local mill and plans early installation of machinery for mining and refining. New plant will cost over \$90,000. Stone & Webster Engineering Corporation, 80 Federal Street, Boston, is engineer.

Milwaukee

WORK has been started by the William F. Eichfeld & Son Co., Milwaukee, recently incorporated, on remodeling shop building, 50 x 120 ft., at East Pittsburgh Avenue and Barclay Street, for production of fabricated steel. Equipment is being purchased. William F. Eichfeld, formerly vice-president and general manager, A. F. Wagner Architectural Iron Works, Milwaukee, is president.

Falk Corp., Milwaukee, has received supplemental order from Bethlehem Shipbuilding Corp., for two ship reduction gears costing \$100,000. Four were previously ordered and total value is about \$350,000. Gears are designed for three new freight and passenger ships for Matson Line.

General Grinder Corp., Milwaukee, recently incorporated to manufacture tool grinders and other mechanical specialties, has leased space at 248 Milwaukee Street. Van B. Hooper, formerly general sales manager, Master Lock Co., Milwaukee, and Louis V. Shaw, are principals in new company.

Heil Co., 1290 South Thirty-first Street, Milwaukee, has placed contract with Klug & Smith Co., 69 East Wisconsin Avenue, local, for storage building, 60 x 115 ft., costing \$40,000.

George B. Sage, city clerk, Spooner, Wis., will be ready for bids about Nov. 10 for a complete Diesel engine power plant for which appropriation of \$50,000 has been made by Common Council.

Waukesha Armature Co., Waukesha, Wis., has been organized by local interests and is establishing shop at 465 West Main Street to do general manufacturing and repair work on dynamos, motors, etc.

Ray Phelps, Beloit, Wis., manufacturer and repairer of electrical equipment, has started work on new shop, 30 x 50 ft., two stories, with two one-story wings, each 30 x 100 ft.

Pittsburgh

A FUND of \$60,000 has been authorized by Borough Council, Tarentum, Pa., for equipment for installation in an addition to municipal electric light and power plant.

Bender Marine Sales Co., Ninth and Peach Streets, Erie, Pa., has awarded general contract to Platt Co., Palace Hardware Building, for one-story marine repair and service shop, 115 x 170 ft., to cost over \$40,000 with equipment.

Treadwell Engineering Co., Midland, Pa., manufacturer of steel plates, steel towboats, barges, etc., has work under way on one-story addition, 75 x 440 ft., to cost over \$85,000 with equipment.

W. H. Truschel, 1530 Market Street,

Wheeling, W. Va., and associates have organized National Coupling & Fitting Co., with capital of \$50,000, and plan operation of local plant for manufacture of pipe couplings, bends, fittings and kindred products.

West Virginia Super-Fuel Co., Moundsville, W. Va., is planning expansion in coal pulverizing and briquette manufacturing plant, with by-products division, to double present capacity, to cost over \$100,000. Company is affiliated with West Virginia Coal Distillation Co.

Sun Oil Co., 1608 Walnut Street, Philadelphia, has plans for a new oil storage and distributing plant at Brownsville, Pa., to cost over \$200,000 with equipment. Company engineering department is in charge.

Spear Carbon Co., St. Marys, Pa., will ask bids at once on a one-story addition, 80 x 120 ft., to cost about \$35,000 with equipment.

Chicago

PLANS are under way by Olive Can Co., 450 North Leavitt Street, Chicago, for one-story addition to cost close to \$60,000 with equipment. Storbel & Clark, 190 North Clark Street, are architects.

Great Northern Railway Co., Railroad Building, St. Paul, Minn., has plans for new steam-operated electric power plant at Williston, N. D., to cost over \$125,000 with equipment. T. D. McMahon, address noted, is company architect in charge.

John Deere Plow Co., Moline, Ill., has awarded general contract to W. A. Klinger, Inc., Warnock Building, Sioux City, Iowa, for three-story and basement factory branch at Sioux City, 70 x 150 ft., with L-extension, 70 x 140 ft., to cost about \$100,000 with equipment. C. A. Eckerman, Moline, is architect; Max Sklosky, Moline, is mechanical engineer.

Swift & Co., Union Stock Yards, Chicago, contemplate new artificial ice-manufacturing and cold storage plant at Sioux City, Iowa, to cost more than \$300,000 with machinery. Company engineering department is in charge. Frank Gale, Sioux City, is local manager.

Board of Education, 460 South State Street, Chicago, is planning installation of complete vocational training department in new multi-story Steinmetz High School, for which general contract has been let to Thorgersen & Erickson Co., 228 North La Salle Street, to cost \$2,500,000 with equipment. Paul Gerhardt, 64 West Randolph Street, is architect.

Union Public Service Co., Pioneer Building, St. Paul, Minn., has approved plans for a one-story steam-operated electric power plant at Lake Preston, S. D., to cost more than \$70,000 with equipment.

Great Lakes Pipe Line Co., an interest of Continental Oil Co., Continental Oil Building, Denver, and Barnsdall Corporation, 622 South Michigan Avenue, Chicago, is planning construction of oil storage and distributing plant about 10 miles south of Minneapolis, providing terminal facilities for new pipe line in course of construction from Barnsdall, Okla., to Des Moines, Iowa; Chicago, Council Bluffs, Iowa; Minneapolis and St. Paul, Minn. Terminal unit will cost over \$500,000 with equipment.

Conveying, elevating, electric-operated and other equipment will be installed in new two-story and basement milk prod-

ucts plant, 160 x 175 ft., to be erected by Roberts' Sanitary Dairy Co., Sioux City, to cost about \$100,000. George B. Hilgers, Sioux City, is architect.

Manufacturers Equipment Co., manufacturer of pneumatic chucks and collapsible taps and parts, has moved from Wallace Avenue and Fillmore Street to 4545 West Lake Street, Chicago.

American Tractor Equipment Co., has opened branch at 1321 South Washington Street, Peoria, Ill., in charge of N. G. Livingston, preliminary to removal of its plant from Oakland, Cal., to Peoria soon after first of year. American Tractor company manufactures equipment used by Caterpillar Tractor Co., which is concentrating manufacture in Peoria, and proximity to that plant prompted the move.

Grigsby-Grunow Co., North Austin and Dickens Streets, Chicago, will build a one-story power house addition and boiler room to cost \$125,000. James L. Fyfe, 225 North Michigan Avenue, is engineer.

Forgings division of Unit Corp. of America, West Allis, Wis., has booked an order from Oliver Farm Equipment Co., Chicago, for parts to be used in tractors being built for Russia, amounting to \$100,000.

Detroit

PLANS have been filed by Consumers Power Co., Jackson, for a one-story mechanical and service shop in conjunction with other equipment buildings at Pontiac, Mich., to cost over \$55,000 with equipment.

Ford Motor Co., Dearborn, is scheduling erection of new assembling plant at Seattle to begin early in November. Company has taken over about 30 acres and will build several one-story units, with power house, pumping station and other structures, to cost over \$2,000,000 with machinery. Albert Kahn, Inc., Detroit, is architect and engineer. Company has work in progress on a tunnel for water intake from Detroit River to power plant at Dearborn, and will increase capacity of local generating station with installation of turbo-generator units, condensers and auxiliary equipment, to cost over \$5,000,000.

Robinson Mfg. Corp., 17128 Filer Avenue, Detroit, recently organized by Frederick R. Robinson and associates with capital of \$100,000, plans operation of local factory for manufacture of brass, bronze, aluminum and other metal products. Harry A. Codde is interested in new company.

Duluth, South Shore & Atlantic Railway Co., West Superior Street, Duluth, Minn., is considering new engine house with shop facilities at L'Anse, Mich., to cost over \$30,000 with equipment.

Michigan Gas & Electric Co., Three Rivers, Mich., has arranged for a bond issue of \$1,190,000, part of proceeds to be used for expansion and improvements.

Board of Water Commissioners, 735 Randolph Street, Detroit, has awarded general contract to W. E. Wood Co., Union Trust Building, for a new turbine power station, with switching plant unit for high-tension service, to cost about \$267,000 with machinery.

Walker & Co., 88 Custer Avenue, Detroit, manufacturers and distributors of neon lighting equipment, electric signs and other outdoor display products, is planning early occupancy of new two-

story plant addition, totaling about 15,000 sq. ft. floor space, for expansion. Company will vacate part of factory on St. Aubin Avenue and concentrate production in new unit.

Horner Flooring Co., Dollar Bay, manufacturer of hardwood products, has awarded general contract to Graham Michels, Houghton, for new one-story mill, 60 x 120 ft., and three smaller one-story units, 60 x 100 ft., 60 x 72 ft., and 60 x 60 ft., with steam power house, to cost about \$100,000 with machinery.

Northern Industrial Gas Co., Fisher Building, Detroit, has applied to City Council for permission to build pipe line into city from Kentucky natural gas fields, and will begin work as soon as permit is secured. Line will be 390 miles long and will be equipped with pressure and booster stations for a capacity of 150,000,000 cu. ft. daily, for service at Detroit and vicinity. It is estimated to cost over \$20,000,000 and scheduled for completion next summer.

Armour & Co., 208 South LaSalle Street, Chicago, are about to start work on new refrigerating plant and warehouse, costing about \$75,000, at Marquette, Mich. F. A. Johnson is local manager.

New England

BIDS will soon be asked on shop equipment for a junior and senior high school at Middletown, Conn.

General Electric Co., Pittsfield, Mass., is taking bids on a transformer tank manufacturing plant, 152 x 542 ft., for which miscellaneous equipment will be purchased.

Edison Electric Illuminating Co., 39 Boylston Street, Boston, is disposing of a note issue to total \$30,000,000, part of fund to be used for extensions and improvements. Company has filed plans for expansion in power house on Arch Street to cost over \$80,000; new rotary converters and auxiliary power equipment will be installed in substation on Atlantic Avenue, in connection with extensions and betterments in present unit. Company engineering department is in charge.

Ralph E. Emerson, Inc., Cambridge, Mass., recently organized by Ralph E. Emerson and James R. Doherty, 171 Second Street, Cambridge, plans operation of local plant for manufacture of sheet metal products, including tanks, pots, etc.

Concannon Shear Co., Danbury, Conn., recently organized by W. F. Concannon, Bridgeport, Conn., and associates, has plans for a two-story plant, 40 x 150 ft., at Danbury for manufacture of shears and other edge tools, to cost about \$40,000 with equipment.

Board of Education, City Hall, Holyoke, Mass., Department of Public Works in charge, will soon take bids on general contract for a three-story vocational training school, 150 x 234 ft., to cost over \$200,000 with equipment. George P. A. Alderman, 316 High Street, is architect.

Hollingsworth & Whitney Co., Gardner, Me., will proceed with construction of one-story steam power plant at paper mill by day labor, to cost about \$40,000 with equipment. Charles T. Main, Inc., 201 Devonshire Street, Boston, is architect and engineer.

Elevating, conveying and other mechanical-handling equipment, etc., will be installed in new multi-story terminal building to be erected at Worcester, Mass., by Northeastern Storage & Dis-

tribution Co., 93 Grafton Street, Worcester, to cost close to \$1,000,000. F. Burrall Hoffman, 147 East Fifty-first Street, New York, is architect and engineer.

Department of Streets and Highways, City Hall, Springfield, Mass., has asked bids on general contract for a two-story and basement equipment storage, service and repair works, to cost about \$50,000 with equipment. McClintock & Craig, 458 Bridge Street, are architects.

Cleveland

CONTRACT has been let by Industrial Rayon Corporation, West Ninety-eighth and Walford streets, Cleveland, to George A. Rutherford, 2725 Prospect Avenue, for one-story machine shop addition, 120 x 124 ft., to cost over \$65,000 with equipment. Christian, Schwarzenberg & Gaede, Union Building, are architects and engineers.

Oakes Bronze & Aluminum Co., Warren, Ohio, has acquired plant of Commercial Galvanizing Co. for expansion. Present unit will be enlarged for production of brass, bronze and aluminum castings.

Norcross Marble Co., Harvard Avenue and Jennings Road, Cleveland, has asked bids on general contract for a one-story addition, 60 x 220 ft., for cutting, finishing, polishing and other service, to cost over \$80,000 with equipment. W. H. Hatch, Hippodrome Building, is architect. J. W. Young is president.

Fox Electric & Mfg. Co., Toledo, Ohio, care of Fraser, Hiett, Wall & Effler, Home Bank Building, attorneys, recently organized, plans operation of local factory for manufacture of electrical specialties. John J. Hendrick and John M. Zuber are principal incorporators.

New York Central Railroad Co., Ohio Division, West Third and St. Clair streets, Cleveland, will build extensions to classification yards at Toledo, to cost about \$1,550,000, including installation of electric car retarders, electric switching equipment, pneumatic tube system, shop facilities, etc. J. H. Spooner is terminal trainmaster at Toledo. Project is scheduled for completion in March.

Sun Oil Co., 1608 Walnut Street, Philadelphia, will soon begin work on new oil storage and distributing plant at Cleveland, to cost over \$125,000 with equipment.

Cutter Sheet Metal Mfg. Co., Cleveland, has been formed to take over and expand company of same name with local plant at 2701 St. Clair Avenue. M. S. Farmer is principal incorporator.

Public auction sale of machinery, equipment, raw materials, etc., of Monobloc Co., New Philadelphia, Ohio, will be held Oct. 27, at 1 p. m. Sale is in charge of Industrial Plants Corp., 930 Beggs Building, Columbus, Ohio, and 25 Church Street, New York.

Cincinnati

BIDS have been asked on general contract by Schieble Toy & Novelty Co., Bainbridge Street and Pennsylvania Railroad, Dayton, Ohio, for an addition and improvements in present factory, to cost over \$40,000 with equipment. Geyer & Neuffer, Ludlow Arcade Building, are architects.

Raymond Bag Co., Middletown, Ohio, manufacturer of paper bags and containers, has purchased 16 acres on Dixie Highway as site for a new mill, for which

plans will be drawn by Lockwood Greene Engineers, Inc., Hanna Building, Cleveland. It will consist of one-story unit for straight-line production, and will cost \$300,000 with machinery.

Owensboro Gas Co., Owensboro, Ky., is considering extensions in gas system, including pipe lines for high pressure service, regulator equipment and accessory apparatus.

Board of Trustees, University of Cincinnati, University Campus, Cincinnati, has authorized plans for a new central mechanical and repair shop, with equipment storage and distributing unit, to cost \$100,000 with equipment. Hunt & Allan, Eagle Savings & Loan Building, are architects. Board will also erect new chemistry and physics building to cost \$400,000, for which plans will be drawn by Crowe & Schulte, 2436 Reading Road, architects.

Battery Parts Mfg. Co., Memphis, Tenn., is planning to rebuild part of plant recently destroyed by fire, with loss about \$35,000 including equipment.

Ovens, power equipment, conveying and other machinery will be installed in new two-story baking plant, 125 x 200 ft., to be erected by Brown, Greer & Co., 415 Union Avenue, Knoxville, Tenn., operating Kern's Bakery, to cost over \$200,000 with equipment. W. E. Long & Co., 155 North Clark Street, Chicago, are architects and engineers.

Contracting Officer, Wright Field, Dayton, Ohio, is asking bids until Oct. 28 for carriage and stove bolts, machine nuts, screws, etc.; until Nov. 3 for assemblies.

Indiana

OFFICIALS of Circle Motor Inn, 9 West Market Street, Indianapolis, headed by Skiles E. Test, president, have organized Capitol Motor Inn, Inc., to erect a five-story automobile service, repair and garage building, 53 x 200 ft., on property recently acquired, to cost over \$200,000 with equipment. Bishop, Knowlton & Carson, 312 North Meridian Street, are architects.

Board of Education, Hammond, is considering installation of manual training equipment in new two-story and basement junior high and grade school, 215 x 325 ft., to cost about \$500,000, for which bids are being asked on general contract until Oct. 28. Louis C. Hess, First Trust Building, is architect.

General Motors Corp., Detroit, has purchased plant of Martin-Parry Corp., Indianapolis, manufacturer of automobile bodies, etc., consisting of units with total floor space of 850,000 sq. ft., on 40-acre tract, for new body-manufacturing plant for Chevrolet Motor Co. Division. Martin-Parry Corp. will continue production as heretofore at plants at York, Pa., and Kearny, N. J. J. A. Jamieson, controller of Chevrolet company, will become general manager at Indianapolis.

Officials of Carl Freyn Plumbing & Heating Co., Inc., 221 Indiana Avenue, Indianapolis, manufacturer of plumbing and heating equipment, have organized Freyn Vacuum Force Cup Co., Inc., with capital of \$15,000, as an affiliated interest, to manufacture engineering specialties. New company is headed by Carl Freyn and Merle N. A. Walker.

Northern Indiana Public Service Co., Hammond, has applied for permission to dispose of a new bond issue totaling \$14,000,000, part of fund to be used for extensions and improvements in power plants and system, and acquisition of other properties.

Kemp Brothers, Frankfort, are planning to rebuild part of food product packing and canning plant, including storage and distributing division, destroyed by fire Oct. 13, with loss of over \$80,000.

An order for hollow metal products, amounting to \$700,000, has been secured by Metal Door & Trim Co., LaPorte, Ind., for Los Angeles General Hospital. Production will start Jan. 1 and continue over two-year period.

Gulf States

WORK is under way by Central Power & Light Co., San Antonio, Tex., on cold storage and refrigerating plant on local site, to cost over \$225,000 with machinery.

Bulk Transportation Co., Mobile, Ala., has awarded general contract to Gwin Construction Co., 3503 Fern Street, New Orleans, for a one-story storage and distributing plant, 50 x 350 ft., installation to include conveying and other mechanical-handling equipment, steel chutes, etc., to cost over \$65,000.

W. A. Atherton, East Front Street, Fort Worth, Tex., and associates have organized A-Z Boiler & Tank Co., with capital of \$100,000, to operate a local plant for manufacture of boilers, tanks and other plate products, and will begin work soon.

Cleveland Tractor Co., Euclid Avenue and East 193rd Street, Cleveland, has acquired six acres at San Antonio, Tex., as site for new factory branch, storage and distributing plant, initial unit to cost over \$60,000 with equipment. J. W. Francis, 1113 West Houston Street, San Antonio, is local representative.

Transmississippi Utilities Corp., Waco, Tex., operating Texas Consumers Water Co., Southwest Water Co., and other utilities, is arranging for bond issue of \$350,000, part of proceeds to be used for expansion and improvements, including pipe lines, pumping stations, etc.

Crockett County Board of Education, Ozona, Tex., contemplates installation of manual training equipment in new three-story high school, for which a bond issue of \$170,000 has been approved. Peters, Strange & Bradshaw, Lubbock, Tex., are architects.

Alabama-Georgia Syrup Co., Montgomery, Ala., has awarded general contract to Jehle Brothers, Montgomery, for two-story cold storage and refrigerating plant, 62 x 152 ft., to cost about \$65,000 with machinery. Walter A. Ausfeld, Shepherd Building, is architect.

City Council, Fort Worth, Tex., is considering erection of municipal artificial gas plant and system, to cost over \$400,000 including purchase of existing privately owned property and expansion. A bond issue will be arranged soon.

Birmingham Slag Co., Birmingham, is considering rebuilding part of plant at Ensley, Ala., destroyed by fire Oct. 10, with loss over \$50,000 including equipment.

Morton Salt Co., 208 West Washington Street, Chicago, will proceed with erection of new one and two-story plant at Grand Saline, Tex., to cost over \$80,000 with equipment. Refinery will be operated in conjunction with salt mines in that district. Allen & Garcia, McCormick Building, Chicago, are architects and engineers.

Humble Pipe Line Co., Houston, Tex., a subsidiary of Humble Oil & Refining Co., same address, will begin installation of pipe line from Van oilfield to Louisiana

State line at Jonesville, to cost over \$2,000,000 with booster stations and other operating equipment.

Board of Port Commissioners, New Orleans, is considering erection of municipal airport on lake front, including hangars, repair shops, administration building and other field units, to cost over \$750,000 with equipment.

St. Louis

CONTRACT has been let by Kansas City Oxygen Gas Co., 2012 Grand Avenue, Kansas City, Mo., to Miller-Stauch Construction Co., Railway Exchange Building, for one-story plant at North Kansas City, with foundations to carry an additional story, to cost about \$70,000 with equipment. Charles A. Smith, Finance Building, is architect.

C. Hargrave, 5550 Natural Bridge Road, St. Louis, and associates have organized Positive Safety Switch Lock Co., 1914 Olive Street, with capital of \$20,000, and plans operation of local plant for manufacture of patented locks and locking devices.

Phillips Petroleum Co., 6291 Suburban Avenue, St. Louis, with headquarters at Bartlesville, Okla., has purchased 288 acres near Cahokia, Ill., as site for new oil terminal and distributing plant for pipe line system in course of construction from Borger, Tex., to Wichita, Kan., Kansas City and St. Louis. Terminal unit will cost over \$2,000,000 and will be operated in name of Phillips Pipe Line Co., an affiliated organization.

Pet Milk Co., Arcade Building, St. Louis, is considering tin can manufacturing plant at Greeneville, Tenn., to cost over \$75,000 with equipment, output to be used for condensed milk plants in Tennessee, Kentucky, Virginia and other points.

Gooch Milling & Elevator Co., Lincoln, Neb., has awarded general contract to Ryan & Flynn, Lincoln, for three-story addition to grain mill and elevator, 41 x 150 ft., to cost about \$85,000 including elevating, screening and other equipment. Horner & Wyatt, Board of Trade Building, Kansas City, Mo., are architects.

In connection with rebuilding zinc plant and smelter, recently destroyed by fire with loss of about \$100,000, Athletic Mining & Smelting Co., South Fort Smith, Ark., has secured permission to build a pipe line from natural gas properties in LeFlore County, Okla., to plant site.

Vickers Machine Works, Smackover, Ark., manufacturer of oil well tools and equipment, has secured property at Oklahoma City, Okla., and contemplates early removal to that location, or establishment of branch works. New unit will cost over \$30,000 with equipment.

Champlin Refining Co., Enid, Okla., is planning to rebuild part of ethyl gasoline refinery recently destroyed by fire, with loss over \$60,000 with machinery.

Board of Education, Maud, Okla., contemplates installation of manual training department in new two-story and basement high school, for which superstructure will soon begin, to cost \$125,000. Albert S. Ross, American Building, Ada, Okla., is architect.

Boeing Air Transport, Inc., Georgetown Station, Seattle, affiliated with Boeing Airplane Co., same address, has begun construction of new hangar at airport at Omaha, Neb., to include repair departments, to cost about \$75,000 with equipment.

City Council, Oklahoma City, Okla., has surveys under way on tract of 640 acres about seven miles from city for municipal airport, to include hangars, repair shops and other field units, to cost over \$100,000 with equipment. Charles S. Russell, Hightower Building, is airport engineer in charge.

Pacific Coast

A ONE-STORY equipment storage and distributing plant, 50 x 110 ft., is planned by San Joaquin Light & Power Corp., Fresno, Cal., for erection at Merced, Cal., to cost about \$35,000 with equipment. Company engineering department is in charge.

Sunland Sulphur Co., 2148 Inyo Street, Fresno, Cal., has plans for a new one-story mill between Fresno and Calwa, for refining and distribution, to cost about \$100,000 with machinery. J. H. Wright is superintendent in charge.

La Verne Co-Operative Citrus Association, La Verne, Cal., has approved plans for a new one-story precooling and refrigerating plant, to cost close to \$100,000 with machinery.

Hoyt Heater Co., East Tenth and High Streets, Oakland, Cal., has awarded general contract to F. C. Stolte, 3455 Laguna Avenue, for a one-story shop unit, to cost close to \$20,000 with equipment.

Calistoga Grammar School District, Calistoga, Cal., has authorized installation of a manual training shop in a new local school unit, to cost about \$100,000. Davis-Pearce Co., Inc., Builders' Building, Stockton, Cal., is architect.

Pacific Gas & Electric Co., 245 Market Street, San Francisco, has applied for permission to construct four hydroelectric generating plants on North and South Forks of Battle Creek, Shasta County, to cost over \$1,500,000. Company engineering department is in charge. Company is arranging extensions and improvements in transmission lines and facilities at Stockton, Cal., to cost \$350,000 with equipment.

Schack & Young, Central Building, Seattle, architects, have plans for a five-story and basement automobile service, repair and garage building, to cost about \$170,000 including equipment.

City Council, Beverly Hills, Cal., is asking bids until Nov. 5 for one booster pumping unit and hydro-pressure tank. B. J. Firminger is city clerk.

Southern Sierras Power Co., Riverside, Cal., has been awarded contract by Department of Interior, Washington, to furnish power for construction of Hoover Dam, Arizona-Nevada, to include construction of emergency power station, transmission lines, power substations, etc., total cost to Government, including power consumption, to be \$1,730,000.

Canada

PLANs have been prepared for \$750,000 textile factory at Drummondville, Que., for Canadian Celanese, Ltd. Contracts for erection will be awarded soon.

Canada Wire & Cable Co., Ltd., 940 Inspector Street, Montreal, will start work immediately on a plant at East Montreal, one story, 100 x 650 ft., to cost \$175,000.

Anaconda American Brass, Ltd., New Toronto, Ont., is having plans prepared for a one-story addition to tube mill.

Preliminary work is under way for establishment of a \$631,000 sugar beet factory on Bear Creek, Petrolia, Ont., Frank J. Potts, 4836 Maplewood Avenue, Detroit, is president and engineer. Tenders will be called soon for main building, 70 x 600 ft.; beet shed, 100 x 500 ft.; warehouse, 70 x 210 ft.; dryer house, 70 x 80 ft., and other structures.

Anglin Norcross, Ltd., 892 Sherbrooke Street West, Montreal, has been awarded general contract for a factory at St. Johns, Que., for Canadian Potteries, Ltd., to cost \$400,000.

Flexlume Sign Co., Ltd., 1074 Queen Street East, Toronto, Ont., has awarded contract to Weller & Co., Ltd., 54 Tecumseh Street, for an addition, 80 x 241 ft., to cost \$125,000. N. A. Armstrong Co., Ltd., 7 King Street East is architect.

Bancroft Power Co., Bancroft, Ont., has started work on an electric light plant to cost \$50,000. Harry Studwick is secretary.

W. L. Faul, engineer, City Hall, Hamilton, Ont., is preparing plans for machine and repair shops, to cost \$70,000 with equipment.

Machine shop at La Fleche, Sask., owned by Fortune Pollquin, was recently destroyed by fire with loss of \$10,000.

R. H. Trouth & Co., Canadian Pacific Railroad Building, Edmonton, Alta., has been awarded contract for machine shop for University of Alberta, Edmonton, to cost \$19,000. C. S. Burgess is architect.

Foreign

ARRANGEMENTS have been made by American Metal Co., 61 Broadway, New York, for purchase of 800,000 shares of stock of Roan Antelope Copper Mines, Ltd., London, England, with copper properties in Northern Rhodesia, and for 1,000,000 shares of stock of Rhodesian Selection Trust, Ltd., an affiliated organization with holdings in same district. Purchasing company will be active in management in future. Properties consist of about 140,300 acres of copper-bearing lands and plants and equipment will be installed to begin production during coming year. An associate company, Mufullira Copper Mines, Ltd., will also build a plant to be ready for operation in 1932. Plans are under consideration for large electrolytic copper refinery in England to handle part of output of Roan mines. Otto Sussman is president of American Metal Co., and Harold K. Hochschild, vice-president.

Creole Petroleum Corp., 26 Broadway, New York, operating oil properties in Venezuela, is arranging for an increase in capital, part of proceeds to be used for expansion of oil plants and system, and development of additional properties.

Central Public Service Corp., 105 West Adams Street, Chicago, is negotiating for purchase of electric light and power, gas, ice, water and other public utility properties of United Utilities & Service Corp., Fox Building, Philadelphia, in Canary Islands, Dominican Republic, Porto Rico, Haiti and Philippine Islands. Purchasing company will operate as a foreign unit and plans expansion and improvements.

Petrix Chemische Fabrik, A. G., Berlin, Germany, manufacturer of dry batteries, battery cells, industrial chemicals, etc., is arranging for an increase in capital from 500,000 to 1,000,000 m. (\$120,000 to \$240,000), part of proceeds to be used for expansion.

British Steel Men Discuss Problems with Czechoslovakian Hosts

MANY features of unusual technical and commercial interest to steel makers characterized the autumn meeting of the Iron and Steel Institute (British), held in Czechoslovakia, Sept. 14 to 20. Engineers attended from at least ten different countries, including all the principal iron and steel producing nations of the world. The papers, though few in number, were important and well discussed.

But especially the steel practice of Czechoslovakia exhibited an unusually excellent combination of good quality and low cost. The latter was due in part to the very low scale of wages, but also to progressiveness and expertness in the manufacture and further treatment of the steel, while both depended on the extent and thoroughness of semi-fundamental research—far more basic than mere "trouble shooting"—and its intelligent and scientific application to the steel processes themselves. This was especially true of the well-known Skoda Works, the majority of the stock of which is now owned by Schneider & Cie., also known as the owner of the Creusot Works and others.

Eager to Impart Information

The value of the visit was enhanced by the freedom with which every detail was shown and every question answered; by essential information posted in diagram and placard form at points of vantage in the different departments visited; by English-speaking guides enrolled from the engineering staff of the works, who freely called on the superintendent of a department when a question was asked which was outside the guide's knowledge; by an organization and systemization of the visiting parties whereby, in many cases, a man was enabled to spend a longer time, or make a special visit, to a department in which he was especially interested, and by comprehensive descriptions prepared especially for the meeting and distributed in printed form to everyone attending.

An example of this is a cloth-bound volume of 248 pages, with numerous inserts, maps, drawings, engravings from photographs, compiled by Dr. Antonin Kriz, director of research of the Skoda Works, with the collaboration of eight engineers, metallurgists and managers of the different important works. This book is practically an extensively illustrated treatise on

the iron and steel industry of the republic.

Books of Data Furnished to Guests

It begins with a summary of the commerce and industry of Czechoslovakia; then a general account of its iron and steel industry and mining; followed by detailed descriptions of the three large works, viz.: Skoda, the Czechoslovak Mining & Iron Works Co., of which again Eugene Schneider is chairman, and Witkowitz. The last 50 pages are devoted to four smaller companies.

This volume was the gift of the Association of Czechoslovakian Engineers (Spolek Ceskoslovenskych Inzenyru), who were the generous and efficient hosts of the institute during the meeting. In addition, each visitor received an illustrated book, prepared for the meeting, on the Skoda Works and on the Czechoslovak Mining & Iron Works, as well as 30 pictures, with descriptions, of Witkowitz, and other photographs and illustrations.

While the steel industry of Czechoslovakia is small, nevertheless the well known initiative of the companies and the excellence of the results achieved, combined with the frankness with which information was given, made the meeting of great value to those who attended. Too much cannot be said of the generosity and efficiency in hospitality of the engineers and steel companies who played host on this occasion.

Technical Papers at Two Sessions

Two mornings were devoted to presentation and discussion of technical papers, three having been handled at each session. In addition, five others were presented in printed form.

Six of the papers which were read and discussed will appear separately, with their discussions, in later issues of THE IRON AGE. These include:

"Heterogeneity of an Ingot Made by the Harmet Process," by Dr. Ant. Kriz, Plzen, Czechoslovakia.

"Open-Hearth Furnace Steelworks—a Comparison of British and Continental Installations and Practice," by H. C. Wood, London.

"High-Frequency Steel Furnaces," by D. F. Campbell, London.

"What Reasons Compelled the Prague Ironworks Co. to Introduce Thin-Walled Blast Furnaces," by Dr. Jindrich Sarek, Kraluv Dvur, Czechoslovakia.

"A Contribution to the Problem of

the Analysis of Basic Slags and the Representation of Their Composition in a Triangular Diagram," by Prof. Otakar Quadrat, of the Department of Metallurgy, Technical University, Prague.

"Permanence of Dimensions Under Stress at Elevated Temperatures," by Dr. W. H. Hatfield, Brown-Firth Research Laboratories, Sheffield.

British Iron and Steel Output Up in September

LONDON, ENGLAND, Oct. 17 (*By Cable*).—Pig iron and steel output in Great Britain in September was larger than in August at 425,000 gross tons of pig iron and 580,600 tons of steel ingots and castings. Both, however, are under the 1929 monthly averages.

The monthly output in gross tons this year, with comparisons, is shown below:

	Pig Iron	Steel
September, 1930.....	425,000	580,600
August, 1930.....	416,700	451,300
July, 1930.....	486,100	621,400
June, 1930.....	563,200	600,100
May, 1930.....	614,500	692,800
April, 1930.....	619,600	696,100
March, 1930.....	665,800	826,100
February, 1930.....	597,000	776,400
January, 1930.....	650,000	771,100
Monthly average, 1929.	631,600	800,600

Steel Institute Issues New Metal Tariffs

The American Iron and Steel Institute has published in booklet form the new metal schedule of the Tariff Act of 1930. The schedule has been compiled by Thomas J. Doherty, tariff counsel of the institute, who has planned it for ready reference. Articles which have been the subject of decisions or rulings are listed under individual names with a citation of the decision or ruling.

Output of Steel Barrels Higher in August

WASHINGTON, Oct. 21.—The output of steel barrels rose to 564,927 units from 553,842 in August, according to the Department of Commerce. In the first nine months of the present year, production totaled 6,029,555 barrels as against 6,511,304 in the corresponding period of last year.

European Mills Suspend Output as Steel Prices Reach New Low Levels

(By Cable)

LONDON, ENGLAND, Oct. 20.

THE general situation is unchanged. Cleveland pig iron producers are gradually decreasing their stocks, as output is so limited, but demand is practically restricted to the local steel works and export sales continue negligible.

Cleveland furnacemen's and miners' wages have been reduced 3.5 per cent and 4 per cent respectively, but the furnaces are unable to pass on this benefit to consumers. Italy has bought some fair quantities of hematite.

Steel is generally dull but makers have decided to retain present prices, considering that a reduction would be unlikely to stimulate business.

New shipbuilding is quiet and railway companies are practicing strict economy in their buying. Domestic structural steel requirements are lessening and export demand is mostly Colonial Government orders and occasional bridge contracts.

British consumers of Continental semi-finished material have shown some interest in buying, but demand both here and abroad is very poor and certain Continental works are closing plants. The Cockerill and Providence works have suspended production of steel bars because of low prices.

There is persistent discussion of renewal of the Continental Steel Cartel from Jan. 1 on a revised basis.

Tin plate is less in demand, consumers expecting lower prices. Merchants and mills outside the conference are quoting a shade less than the

Two French plants close bar mills after further decline in prices.

* * *

Dismissal of 4000 more workmen announced by Friedrich Krupp, A. G., Essen.

* * *

Wages of furnacemen and miners in England reduced slightly.

* * *

Soviet Union places \$3,750,000 in steel contracts with Poland.

* * *

Belgian steel products penetrating foreign fields, especially Cuba and China.

a 14,000-ton oil tanker from an American interest.

Thomas W. Ward, of Sheffield, will remove the wreckage of the airship R-101 from Beauvais, France.

Henschel of Kassel in Germany will furnish 61 locomotive boilers to India. The Friedrich Krupp, A.G., Essen, announces the impending dismissal of another 4000 men at Essen.

German pig iron output in September was 653,000 tons, with 69 furnaces active at the end of the month.

The Vereinigte Königs und Laurahütte, the Bismarckhütte, the Sosnowice Tube Works, Huta Bankowa, and the Modrzejew have formed a Polish Tube Cartel.

The Anshan Steel Works in Manchuria has erected an additional blast furnace with 500 tons daily capacity. The Karaiben-Oslo Shipping Co. of Norway is building four steamers at Danzig for transporting bauxite from Guiana to Canada.

schedule, but business is greatly restricted.

British rollers of galvanized sheets are quoting No. 24 gage corrugated sheets in bundles for India at £12 per ton (2.61c. a lb.), c.&f., and £11 12s. 6d. per ton (2.53c.), f.o.b., for other markets, but there is almost no business.

Belgian competition is increasing and Belgian mills are now securing substantial Chinese orders. Black sheets are quiet.

The Cleveland Bridge & Engineering Co. has been awarded the contract for a new Zambesi bridge and 25 miles of new railroad to cost about £1,500,000 (\$7,290,000).

Swan, Hunter & Wigham Richardson, Ltd., has received a contract for

More Reductions in German Locomotive Output

HAMBURG, GERMANY, Sept. 29.—The locomotive builders have been notified by the German Railways Corp'n. that not more than 100 locomotives a year will be required by the railroads for the next three to four years. As the total capacity, even after the recent drastic curtailment, is still about 2500 locomotives annually, and only about 350 a year can be sold in foreign markets, fur-

British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp, with the £ at \$4.8665 (par)

British Prices f.o.b. United Kingdom Ports

Ferromanganese, export.	£11 5s.	to £11 10s.	\$54.75 to \$55.95
Billets, open-hearth.	5 15	to 6 5	27.98 to 30.41
Black sheets, Japanese specifications	12 5		59.61
Tin plate, per base box	0 17	to 0 17 1/4	4.13 to 4.19
Steel bars, open-hearth.	7 15	to 8 5	1.69 to 1.79
Beams, open-hearth.	7 7 1/2	to 7 17 1/2	1.60 to 1.71
Channels, open-hearth.	7 12 1/2	to 8 12 1/2	1.66 to 1.87
Angles, open-hearth.	7 7 1/2	to 7 17 1/2	1.60 to 1.71
Black sheets, No. 24 gage	9 10	to 9 15	2.06 to 2.12
Galvanized sheets, No. 24 gage	11 12 1/2		2.52

Continental Prices, f.o.b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	£2 11 1/2 s.	to £2 12 s.	\$12.51 to \$12.64
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Billets, Thomas (nominal)	3 10	to 3 11	17.01 to 17.25
Wire rods, low C., No. 5			
B.W.G.	5 2 1/2	to 5 7 1/2	24.94 to 26.15
Rails, light	6 0		29.20
Black sheets, No. 31 gage, Japanese	11 5	to 12 12	54.68 to 58.32
Steel bars, merchant.	4 2	to 4 2 1/2	0.93 to 0.94
Steel bars, deformed.	4 2	to 4 3	0.93 to 0.94
Beams, Thomas, British standard (nominal)	3 17	to 3 18	0.84 to 0.85
Channels, Thomas, American sections	5 12	to 5 14	1.24 to 1.26
Angles, Thomas, 4-in. and larger, over 3/4-in. thick	3 16	to 3 17	0.84 to 0.85
Angles, Thomas, 3-in.	4 2	to 4 3	0.93 to 0.94
Hoop and strip steel over 6-in. base	4 12 1/2	to 4 15	1.00 to 1.05
Wire, plain, No. 8 gage.	3 15	to 3 17 1/2	0.84 to 0.85
Wire, barbed, 4-pt. No. 12 B.W.G.	9 12 1/2		2.09
Wire nails, base.	5 15		\$1.26 a keg

ther suspension of locomotive shops is planned. As the railways corporation is expected to place its entire requirements with three or four of the 12 existing makers, many of the smaller companies are expected to close permanently.

Soviet Buys Steel In Poland

HAMBURG, GERMANY, Sept. 29.—Further large steel orders, totaling about \$3,750,000, have been placed by the Soviet Union with the Vereinigte Königs und Laurahütte and the Kattowitzer A. G. in Poland. The orders include sheets, bars, plates, hoops, wire products and some rolling stock.

Recently German machinery manufacturers have been meeting to establish new terms for business with the U. S. S. R., as about \$5,000,000 worth of business has recently been placed by the Russians with British companies on very short term credits. It is expected that German sellers will decide to shorten their terms to the Soviet instead of lengthening them.

Italy Forms Standards Organization

WASHINGTON, Oct. 14.—A national organization for the creation of recognized standards in industry and trade has been established by the Italian government, according to a report to the Department of Commerce from Rome. The organization, the Entente Nazionale per l'Unificazione delle Industrie, will be commonly known as "Uni." It will seek to standardize methods and procedure for industrial production and for the sale of its products and to establish standard types of tools, machinery and parts. Connections with similar foreign organizations may be established.

Steel Tubing Used for Building Frames

HAMBURG, GERMANY, Sept. 29.—Construction of small buildings with steel framework composed of tubing, which was recently developed in England, is being introduced on the Continent. A number of small buildings are being constructed in Germany with steel tubing frames instead of structural shapes.

HAMBURG, GERMANY, Sept. 29.—On Aug. 31, employment in the German coal industry was 87,000 less than at the end of August last year and September has seen the dismissal of 6000 more. Coal stocks are large.

Belgian Steel Gains in Cuba

American Products Undersold \$3 a Ton and More Despite
Preferential Duty

WASHINGTON, Oct. 7.—European countries, especially Belgium, are making a most determined bid for Cuban steel business, quoting prices in certain instances below those for similar American products, according to a report to the Department of Commerce from Havana.

While American manufacturers continue to obtain the major part of the Cuban trade in iron and steel, competition from European producers is becoming increasingly severe. Of the 94,923 metric tons imported by Cuba in 1929, the United States supplied 54,880 tons direct, and Belgium 33,310 tons. In 1928 Cuba imported 82,384 tons, of which 52,222 tons was shipped direct from the United States and Belgium supplied 23,819 tons, ranking next to the United States in both years. Import statistics are not available for the current year, but it is suggested that they may disclose growing European competition, and may develop that the position of the United States has further declined.

The rise of Continental competition in the Cuban market appears to be caused almost entirely by the price factor. An example is the recent sale of Belgian merchant steel bars at 1.15c. a lb., ex ships tackles, Havana, which, taking into consideration the landing charges and preferential duty on American goods, is equivalent to an American quotation of about 1.30c. a lb., c.i.f. Havana.

Terms of sale granted by European producers are usually the same as those extended by American makers, a nominal discount of 2 per cent, or 90 days, date of draft, net. With the lowering of prices, however, terms have become an increasingly important factor, as is evidenced by terms of 4 per cent cash discount or 180 days, date of draft, net.

The extent to which Belgium has penetrated the Cuban market is shown by the fact that 71 per cent of the bars imported in 1929 came from that country. Of this tonnage the greater part was concrete reinforcing bars, with only a relatively small proportion of merchant bars. The greater part of the increase in imports in 1929 was due to the extensive highway program that year, which included numerous reinforced concrete bridges and culverts.

Europe supplies much of the Cuban market in standard shapes, but the bulk of special columns and beams are of American origin. The United States also supplies much of the steel required for bridge building, the bulk of rails, track material, barbed wire and staples, and woven wire fencing, chiefly hog fencing, while most of the poultry netting comes from Belgium at lower prices. The United States

is also the principal factor in the trade in wire nails, Belgium ranking second. The United States leads in the trade in tubes, black and coated or galvanized. This statement applies to virtually all classes of tubes with the exception of boiler tubes, in which trade Europe leads because of lower prices and the local preference for Mannesmann tubes.

Canada's Pig Iron Output at New Low Point

TORONTO, Oct. 21.—Production of pig iron in Canada in September amounted to 48,395 gross tons. It was the fourth consecutive month this year to show a new low record, the tonnage having been 16 per cent under the total of 57,459 tons reported for August and 51 per cent less than the 98,816 tons produced in September, 1929. It was the lowest for September since 1925, when output was 34,609 tons.

For the first nine months of the year, production of pig iron was 621,716 tons, compared with 829,687 tons in the first three quarters of 1929 and 745,473 tons for the corresponding period of 1928.

Production of ferroalloys in September, at 3021 tons, was slightly under the total of 3397 tons produced in August. For the nine months ending with September, output totaled 54,703 tons, compared with 64,499 tons and 33,414 tons produced in the corresponding periods of 1929 and 1928 respectively.

September production of steel ingots and direct steel castings, at 55,808 tons, showed little change from the 57,626 tons of the previous month, but was 44 per cent under the 99,000 tons of September, 1929.

For the nine months ended with September, output of steel ingots and direct steel castings totaled 810,852 tons, a decline of 25 per cent from the 1,087,951 tons reported for the corresponding period of 1929, which in turn was 18 per cent over that of the 919,710 tons produced in the three quarters of 1928.

British Centrifugal Pipe Plant Nears Completion

LONDON, ENGLAND, Oct. 11.—The new centrifugal pipe foundry of the Stavely Coal & Iron Co., near Chesterfield, which is nearing completion, is 420 x 200 ft., consisting of a large central hall and several auxiliary bays. Bell and spigot cast iron pipe made under the American sand spun patents will range from 4 to 12 in. in diameter in 16-ft. lengths.

Further Experiences in Nitriding Steel Articles

(Continued from page 1127)

nothing can be told about what is going to happen. Some of them seem to grow, while others seem to shrink by a slight amount.

Nitriding Furnaces and Equipment

WHILE apparently a simple process, nitriding is quite sensitive as to details of procedure. Unless careful attention is paid to these details, unsatisfactory results are obtained.

Mr. Merten's paper describes the furnace equipment of a nitriding plant in which a practically continuous nitriding process is successfully conducted. The equipment consists of two pairs of stationary twin containers heated by two removable bell-type electric furnaces. Each bell furnace serves alternately two containers, thereby approaching continuity of operations, as well as introducing economical features of great importance. Consistently uniform and selective quality of product are assured by an equipment permitting a practical reproduction of conditions essential for obtaining such results.

Outstanding characteristics of this arrangement include stationary boxes or containers, and consequently stationary or fixed ammonia gas piping. The importance of this cannot be over-emphasized for quality work, in view of the fact that leakage of joints will always cause leaching of air into the container and produce inferior results. Oxide films do retard nitriding materially, and also prevent uniform formation and diffusion of the nitrides. Pushing and pulling the containers in and out of the furnace, even on conveyors, subject the containers to straining, affecting the useful life of the box, making necessary frequent repairs, especially on welded joints.

Obviously, welded joints are unavoidable in large equipment, for economical reasons. Moving of the box and the network of piping introduces heavy straining of joints and distortion, accompanied by cracks and consequent leaking. Probably more unsatisfactory nitriding is due to nonsealing joints in ammonia piping and open welded seams of boxes and poor cover seals than to any other factors influencing the quality of the nitrided product.

For starting, the first container is loaded and cover put in position and bolted or clamped. The lead seal is then poured and test for leaks made and leaks eliminated. The bell furnace is then put into position and

the electric current turned on. Simultaneously with this starting of the heating, ammonia gas is turned on and the flow regulated just short of disturbing the lead seal.

This excess flow of gas in the beginning is necessary, to expel the air from the container and prevent superficial oxidation or coloring of steel parts prior to coming to temperature. The flow is retarded somewhat when the temperature rises and is gradually regulated to a standard predetermined volume for the charge. Temperature-control mechanism and occasional observation of gas flow through the water seal at the end of the exit tube during and for the time period of the process will take care of the work. While this furnace is in operation the other container is charged with its load, sealed, tested and prepared for its cycle of heating for nitriding.

As soon as the first container has completed the time period of processing, which is 20 hr. at 975 deg. F., the electric current is turned off. The bell furnace is removed and placed over the second box prepared to receive it. The heat stored in the walls of the bell, of course, is preserved and utilized for heating the second container, shortening thereby the time period for heating up of container to the processing heat.

Cooling of the first container with its nitrided charge proceeds with the ammonia gas flowing, until the charge cools down to approximately 350 deg. F. The ammonia gas is then turned off and the box cover removed. The temperature now is below that at which discoloration and deformation due to sudden or non-uniform cooling occurs, and will therefore not result in deleterious effects on the nitrided parts or the equipment.

After unloading and recharging, sealing and testing, this box is again ready for firing. A process heating cycle of approximately 24 hr. obviously is practically a continuous one, and certainly can be made so, as well as economical, with a double unit pair of containers of suitable dimensions, with bell-type electric heating furnaces.

Brings Up Gas-Fired Furnaces

ONE speaker believes that he gets a better and more uniform distribution of ammonia gas by use of a fan, which gives it a positive circulation. He called in question the somewhat elaborate layout of inlet piping with small holes here and there, as set forth in Mr. Merten's paper.

Another speaker brought up the question of continuous nitriding by means of a gas-fired furnace spe-

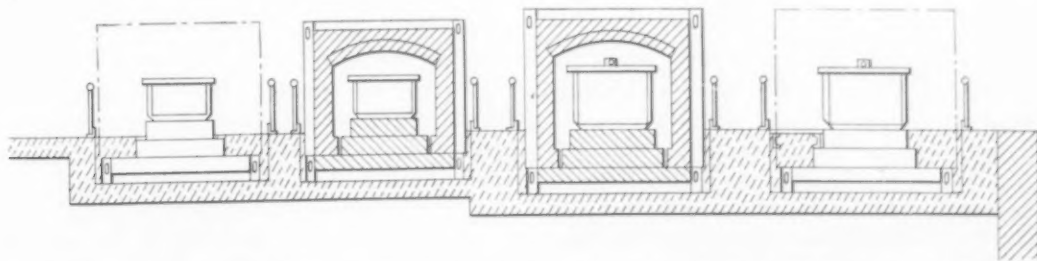


Fig. 1—Diagram of nitriding equipment layout, showing bell-type furnace and stationary twin containers. Two sizes are indicated

cially designed for this purpose. This furnace was briefly described, with the aid of a number of slides, by a representative of the Surface Combustion Co., Toledo, Ohio. It is a muffle furnace, in which the work is introduced through a liquid seal at one end and discharged through a similar seal at the other end. It was stated that we must have a 50 per cent dissociation of the ammonia for proper working. Experiments have shown that the ammonia should flow in a line parallel with the progress of the work through the furnace.

Development of continuous nitriding has been accelerated through some companies having found erratic results in batch nitriding. H. W. McQuaid, of the Timken-Detroit Axle Co., expressed the view that successful nitriding can be carried on at as high as 1100 to 1200 deg. F. if the charge is worked up slowly to temperature in a pure ammonia atmosphere. He suggested getting it up to 750 deg. with no dissociation, then up to 850 deg. with 5 per cent dissociation, then to 950 deg. with about 30 per cent dissociation and finally to 1200 deg. with 80 per cent dissociation.

Under the latter condition he has obtained material having a Vickers-Brinell hardness of 1206, with a remarkably tough interior and without variation from piece to piece. He said that it is very important, in following this procedure, to establish first the original nitrided coating before attempting to go to the higher temperatures.

Kodak Company Uses Motion Pictures

(Continued from page 1131)

on to die No. 2 and rivets. Disposes to tray on high-lift truck at right of press. Inspection for running out of true consists in putting reel on spindle with balance wheel, and twirling.

Operation 15. The assembled reels are again sprayed and baked, after which they are inspected and gaged, the bottoms and covers put on, and a film put in and threaded through slot for final inspection.

Eight Operations on Successive Presses

Another product, reel ends for film reels in the ordinary roll film Kodak, are formed from metal strips in eight operations, eight punch presses set in a row being used. They are formed, several to a strip, and blanking is the last operation. The first operation is forming to raise the hub. Then follow, in order, perforating, bell mouthing, stamping and blanking. These presses make 198 r.p.m. and are operated at 90 per cent of capacity.

The reel ends or flanges are then blued and rust proofed in a battery of rotary, gas-fired furnaces, each about 6 ft. long and 4 ft. in diameter. They are of the tilting type and consist of an outer shell of refractory-lined steel inclosing a metal retort which is rotated by motor through a speed-reduction gear train. A vent in the top of the shell permits the products of combustion to escape into a common duct serving the entire battery, whence they are exhausted to the outside of the building.

A series of gas burners in the bottom of each is

supplied with a gas-air mixture of the proper ratio for complete combustion, air being supplied at 1½ lb. and gas at 4 in. pressure. An overhead monorail for handling the material serves the entire line. Each furnace will process 750,000 parts daily, the heating period being 3 hr. and the temperature 800 deg. F. The flanges are then assembled to the wooden spindles.

Forging Steel and Steel for Oil Well Casing

(Continued from page 1140)

ments for several years. But in 1929 demand arose for a stronger casing that could be set at depths around 10,000 ft. There are two expedients for increasing the physical properties of steel structure, according to the author: Selection of an analysis which will give the desired strength in an as-rolled condition, and heat treating the product to produce the desired strength either by normalizing, air hardening followed by drawing or liquid quench followed by drawing. The casing steel must have qualities to withstand piercing and rolling into a seamless tube, ductility and shock resistance to allow straightening and hardness to permit cutting off and threading. The cost must also be considered, in view of the large amount of casing used.

Comparisons of Alloy Steels

Six types of alloy steels were selected. A 6-ton heat of each, made in an electric furnace, was manufactured into seamless tubing and submitted to similar treatments and tests. Metallographic examinations were made and the physical properties were tabulated. All the steels in their as-rolled condition met the American Petroleum Institute grade D specification, in yield point and ultimate strength, for high-tensile casing, although two alloys, 2½ Mn and 1¾ MnMo lacked ductility and machinability. The 1¾ NiMo and the CrMo steels were handicapped by the high cost of nickel and molybdenum, although they revealed a desirable combination of strength, ductility, toughness and machinability. SiMn and SiMnCr alloys showed good yield point and ultimate strength and a satisfactory hardness. Quenching and tempering of all the steels resulted in vastly increased mechanical properties.

Based on data obtained, a steel of the SiMnCr type appeared to be the logical solution as a relatively cheap steel for deep well casing, and possibly for other seamless steel tubular goods. This in lower alloy content suffices for the present grade D specifications, and with a relatively high content meets the tentative E specification calling for a tensile strength of 110,000 lb. per sq. in. The ductility and shock resistance of casing made of this alloy were shown by flattening under a press. A table giving the physical properties of the experimental steels as rolled, normalized and heat treated was included in the paper.

Steel in Large Tonnage Is Not Normalized

In reply to questions, Mr. Bremmer said that casing steel is made in a 100-ton open-hearth furnace

and practices approximating forging steel practice are followed. The steel is not normalized. Because of large output, a large furnace capacity would be required for normalizing.

A. B. Kinzel, Union Carbide & Carbon Research Laboratories, Long Island City, N. Y., who presided, said that he was particularly interested in the paper because the laboratory work that preceded the test work in the steel plant was conducted in his company's laboratories. Ingot troubles, he said, were greatly reduced by using combinations of alloys. He found little difference in the alloys as rolled and as heat treated. He pointed out that heat treating is very expensive on large sections. The warpage problem appears when the casing is heat treated.

Special Information Obtainable from Mechanical Accounting

(Continued from page 1135)

need closer supervision, or possibly new equipment to replace those items which cause heavy expenditures for maintenance.

It is important that management know which shop departments are causing spoilage, and also which departments are being penalized in their production by inferior or defective materials. The defective labor and material analysis gives all this information, and proves to be a most interesting record of performance when followed consistently from month to month. It becomes more valuable as means are adopted to correct causes, etc., as the effect of management policies may be very easily traced by the comparisons.

Every shop consumes much material, during the course of a month, taken from the general stockrooms. In arriving at correct burden rates for departments it is desirable to know the exact amount of such monthly consumption. The expense requisition report keeps an accurate and comprehensive tabulation of such charges by departments, and furnishes the management with valuable comparative data. The forms illustrated herein are only a few of the many that may be devised to obtain the adequate control and furnish the data required by the management of a machine shop.

There is no end to the many forms of daily, weekly and monthly reports of cost, accounting and statistical information which may be made up in a remarkably short time, both efficiently, accurately and economically, by use of mechanical methods. Business today is controlled by many factors. Unless management has full and complete information regarding all of those factors, success cannot be hoped for.

This information to be of value must be current. Today's information must be rendered today. The mechanical methods used by modern accountancy have contributed in large measure to the success of modern management, in that by these methods management is furnished with more information, more accurately and more promptly than ever before.

General Motors Experience With Tungsten-Carbide Cutting Tools

(Continued from page 1142)

ally about 4 deg.) so as to give maximum support to the cutting edge.

Krupp's recommendations for tool angles, recently modified, are here tabulated.

KRUPP RECOMMENDATIONS FOR TOOL ANGLES

Material to Be Machined	Clearance Angle A, (Plus or Minus 1 Deg.)	Tool Angle B, Deg.
Soft steel.....	4	60 to 65
Hard steel.....	4	65 to 74
12 per cent manganese steel.....	4	80 to 84
Stainless steel.....	4	65 to 74
Chilled cast iron.....	3	82 to 86
Soft steel castings.....	4	68 to 73
Hard steel castings.....	4	73 to 78
Gray cast iron.....	4	74 to 80
Bronze, brass, etc.....	6	65 to 75
Aluminum alloys.....	8	50 to 55

Planer tools, as above but with negative back rake 12 to 15 deg.

So far as a large number of grades of cemented tungsten carbide is concerned, Mr. Prosser believes that this is not necessary. He pointed out that the more numerous the grades, the larger the stock of tools of this expensive material that must be carried. He said that the adoption of only one or two grades for general use should be of advantage both to the user and the supplier. He cited the fact that Widia cemented tungsten carbide is now being furnished in four grades to meet the needs of general use and of special applications.

Cutting Cast Iron and Aluminum

In machining gray iron with tungsten carbide tools Mr. McCoy does not recommend trying to get 1500 ft. a min. when 300 ft. will pay for the tool. He said, however, that in some cases General Motors is getting 600 ft. in gray iron. In cases where an attempt is made to double or triple the speed, it is general practice in General Motors divisions to leave the feed undisturbed and work into the job slowly, the result being that few tools are rejected because they won't work.

In machining aluminum Mr. McCoy stated that the rake angle is increased and all tools are lapped smooth, thereby giving the chip a chance to get away without building up on the tungsten carbide tip. All tools are lapped after grinding, the lap being done sometimes with diamond dust and on other occasions with a much cheaper abrasive. He declared that most General Motors Divisions have their own lapping machines.

In each division of General Motors there is one man who grinds tools. This eliminates the possibility of the machine operator, who is inexperienced at grinding or has his own ideas about how the work should be done, spoiling the grinding work. The profit from using tungsten carbide tools, according to Mr. McCoy, comes from the tool lasting longer and doing a greater amount of work. Mr. McCoy said that milling cutters tipped with tungsten carbide give the biggest saving of all tools. The smaller amount of grinding per tool means less men in the grinding room and fewer milling cutters.

Mr. McCoy said that when ordinary cutters are

Business as Others See It

Digest of Current Financial and
Economic Opinion

A SHARP difference of opinion has emerged from the statistical analyses of the business and economic situation. *Analyst* finds us at a level substantially lower than the bottom of the 1921 valley; *Business Week* reports "our index has risen again, for the fifth consecutive week." The former does report a seasonal increase in September, "of the mildest character."

That organ lays the blame for the fact of depression mainly on two agencies: the enormous growth of installment buying, with a mortgaging of future earnings by those who could ill afford it; and the great 1928-1929 growth of bank credit expansion, based on "our abnormally large holdings of monetary gold."

Somewhat different is the view of a Swedish economist—Gustav Cassel—who attributes a large share of responsibility for world-wide depression to the scarcity of the gold supply. And he says that "if the American Federal Reserve Bank should repeat the fateful mistake committed a year ago, when, to counteract share speculation, the supply of money was reduced and thereby the general price level was forced down, then

the world may expect a still further fall in the price of goods and a further increase of the economic depression."

When Recovery May Be Under Way

There is equally a divergence of view as to when substantial betterment may be expected to begin. *Financial Chronicle* says "the slump has continued so long and proceeded so far that it hardly seems tenable to believe that the end is still far off."

But Brookmire looks for no immediate revival, predicating its stand upon the damage sustained by farm purchasing power, which "is bound to act as a brake on any nearby recovery." That organization thinks we have not yet rounded the bottom and looks for present conditions to be somewhat further prolonged. It is, however, "of the opinion that improvement will become apparent by spring and that 1931 as a whole will be a year of improvement leading to a return to normal by the end of the year."

Commerce and Finance professes optimism for the rest of the calendar year, believing that "indications appear to justify the predictions of reasonable trade ac-

tivity." This view is shared by Alexander Hamilton Institute, which finds the indexes pointing upward during the elapsed portion of October. And S. W. Straus & Co. reports a 4 per cent gain in building permits in September, whereas "normal seasonal factors call for a decline of 9½ per cent."

Think Upturn Near at Hand

That consumption is relatively more stable than production—fluctuating less widely—is taken by Silberling Reports as basis for the statement that "the further below normal productive operations go, the more certainly does this generate potential orders for goods which ultimately lead to an almost simultaneous acceleration of many industrial lines. . . . It is this stage which we can now expect to enter."

September business improvement is found by Harvard Economic Society to be below normal seasonal expectation. Comparing the curve with those for past periods of depression, the society concludes that "the downward movement, measured by both the amount and duration of the decline, is approaching its end," which "may be near at hand."

used in milling cylinder blocks they slide over hard spots which sometimes are encountered, thereby making it necessary to remachine the cylinder blocks. Tungsten carbide tools, on the other hand, do not slide over these spots.

Mr. Robbins, Carboly Co., Inc., Detroit, pointed out the feasibility of using tungsten carbide tools profitably without increasing speeds. In other words, many shops cannot afford the ideal set-up of installing new machines in order to use tungsten carbide and it is a mistake to think that this new material cannot be applied to jobs run on older types of machine tools. This actually is being done with success, the users getting increased life per tool and less down time per machine tool.

An Incentive Plan That Does Not Include Bonuses

(Continued from page 1145)

rating. Assuming that he starts at 60c. an hour, his hourly rate is successively raised to 62, 65, 68 and 70 cents an hour.

Under this incentive plan an employee is given an increase in pay without asking for it—if he is entitled to it. No reductions in pay are made if an employee does not maintain his past efficiency rating. Instead

he is given a notice and, if his efficiency shows no increase, he is discharged. If an employee remains for some time in the C rating his services are likely to be dispensed with, and if a period of depression occurs the men having this rating are laid off first, being followed by Class B men if that becomes necessary. Class A men are sure to retain their jobs, and, if necessary, they are put in other kinds of work than they have been accustomed to doing. In fact, they are used for everything and anything in order to keep them on the payroll. This plan of retaining men according to their efficiency eliminates giving consideration to whether an employee has a family dependent on his earnings or whether he is single.

Conspicuously displayed on the wall at the back of the superintendent's desk are three charts showing the rating of each employee for a period of eight years, as well as the number of days of work he has lost in that period due to voluntary absence, days absent because of sickness, times late, his number and the number of the machine on which he is employed and other information covering his record. The superintendent has only to turn his head and look at this chart to learn an employee's complete record. The summaries shown on these charts are compiled from other charts on which each employee's daily and monthly record is entered.

This Issue in Brief

Cuts costs sharply by overhauling entire shop procedure. When business situation began to look serious, stamping manufacturer mentally took the position that he had no organization and no employees. Functions of employees were entirely redistributed, with excellent results.—Page 1205.

* * *

Cost of die and tool repairs is given daily to production executives in stamping plant. They are required to justify and approve such expenditures even though charged to die shop.—Page 1206.

* * *

Keeps inventory down to minimum by refusal to order anything except the smallest possible package. Minimum quantity is ordered even though this might mean repeating the order every week.—Page 1206.

* * *

Lower price and greater sales effort increases sales 117 per cent over last year. Manufacturer of oil burners and humidifiers has doubled sales without increasing overhead.—Page 1207.

* * *

Inspector checks scrap and production of each operation at regular intervals and reports to the factory superintendent. If standards are not adhered to the situation can be remedied at once.—Page 1209.

* * *

Gives superintendent and foremen standard cost sheet showing figures on which selling price is based. Cooperation in lowering costs is thus secured. Deviations from standard costs are shown in dollars and cents and never in percentage figures.—Page 1209.

* * *

Lower cost and higher strength are achieved by spinning steel tubing spring heads, instead of brazing. Red-hot section of seamless tubing is placed in expanding machine. Revolving mandrel expands metal. Tube is then set in spinning machine and spun down to hemispheric shape.—Page 1225.

NEXT WEEK

Notable economies and expanded output have been obtained in the open-hearth plant of one of our largest steel companies. The basis is controlled burning of mixed metallurgical gases. Next week's issue will treat this liveliest of topics at some length.

What the ferrous industry has done for brass and copper mills, and inferentially what it may yet do, will be detailed next week.

* * *

Two clerks keep detailed costs for foundry with annual output of 10,000 tons and over 100 active accounts, involving each month hundreds of different patterns. Cost program reduces expenses and prevents loss on unprofitable jobs. It also shows where jobs can be profitably taken at a lower price rather than lose the business.—Page 1210.

* * *

Gear manufacturer obtains more competent workers, better production and less waste. Eight-week course of two lessons a week was arranged at trade school, and paid for one-half by city and one-half by State.—Page 1212.

* * *

Daily profit and loss statement is placed before production executives. Adverse variations can be remedied promptly. —Page 1209.

* * *

Power consumption of direct motor-driven saw is less than that of motor-driven belted saw, during cutting of identical steel beams. Belted saw requires from 40 to 45 per cent more power.—Page 1228.

New production broom must not sweep too clean. New department heads often hurt themselves by eagerness to make a showing in a hurry, thus antagonizing their subordinates. Lasting results are obtained slowly.—Page 1216.

* * *

Rapid depletion of high-grade low-silica iron ores can be slowed down by magnetic roasting of the high-silica hematites so that it can be used by mixing with high-grade ore. Total cost of treating will run about 30c. a ton of concentrate.—Page 1219.

* * *

Deep drawing qualities of sheets can be determined by X-ray. Fibered or "banded" cold rolled sheets or strip are unsuitable for stamping or forming, as the crystals are in the same relative position. The steel is best for forming when crystals are in random orientation.—Page 1221.

* * *

Get accurate finish in match plate castings by making master patterns so that certain parts of the working patterns can be accurately machined. Only the irregular curves have to be worked out to template by hand.—Page 1214.

* * *

Stamping manufacturer finds it profitable to take the machines to the work, rather than the work to the machines. Even on a run that will last only two or three days, 25,000 lb. machines are moved into a production line.—Page 1205.

* * *

Bonus payments are withheld to apply as unemployment insurance. Kentucky manufacturer pays the bonus when employees work less than 36 hours a week.—Page 1208.

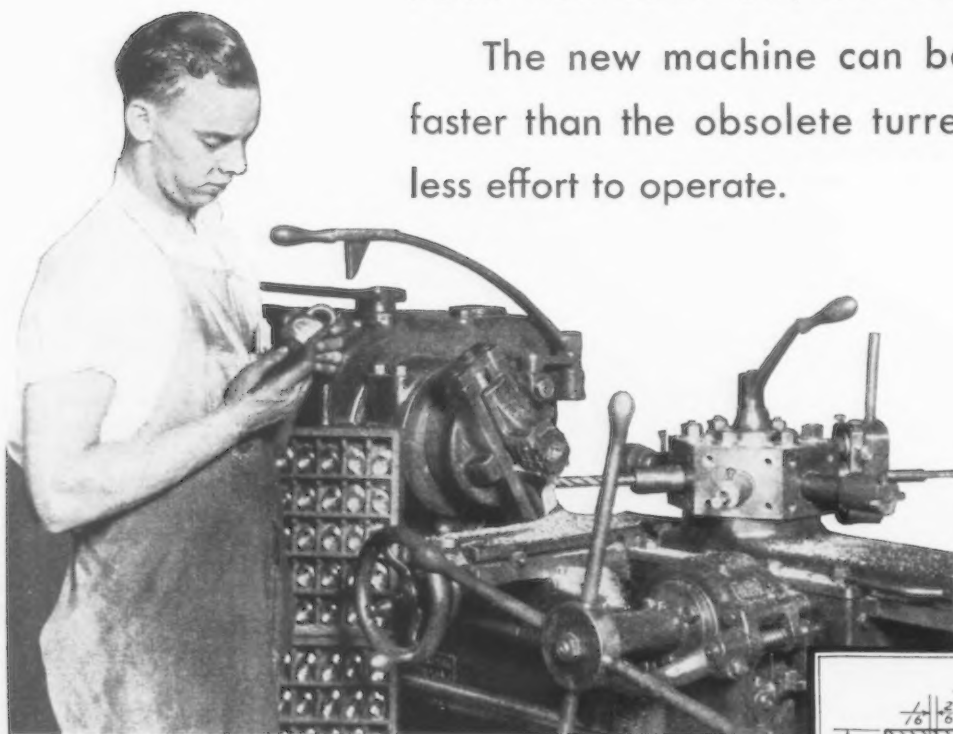
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Where foundry departments estimate their costs on a flat price basis, they never know which items are being manufactured at a loss. By pricing different items they can ascertain which should be dropped or redesigned.—Page 1210.

It pays to replace obsolete turret lathes!

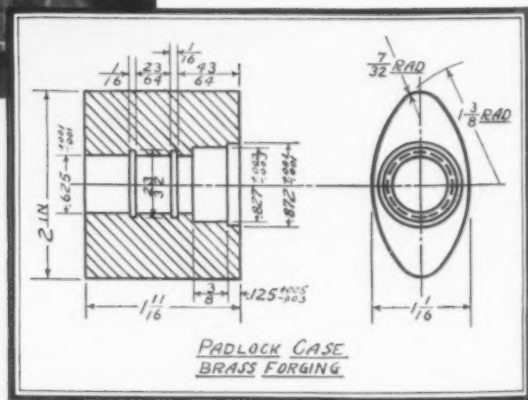
By replacing an old cone type turret lathe with a new Warner & Swasey No. 4 All-Geared Head machine, production was increased from 40 to 60 pieces per hour (an increase of 50%) at the FOUR WAY LOCK CO., CLEVELAND, OHIO.

The new machine can be speeded up 70% faster than the obsolete turret lathe and requires less effort to operate.



**It will pay you to replace
your obsolete turret lathes!**

Have a W & S engineer come into your shop and show you how you can profitably do this. There is no cost or obligation on your part.



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